TECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

PUBLIC LIBRARY
FEB 6 1943
DETROIT

Volume 35 | February 3, 1943 | Number 5

PRICES: Issued the day before P.I.W.C. met, an OPA statement asserted the price agency finds nothing in the Tariff Commission study of crude production costs to justify a price increase. P.I.W.C., which had an exhaustive study of its own on crude prices and their effect on reserves, held it up, debating what action to take in view of OPA's publicity **(P. 3)**. Throughout the week appeals for price increases came from industry members and groups. Sen. O'Mahoney mapped a fight to get prices for Wyoming black oils increased; California Oil & Gas Assn. asserted a 50-68c per bbl. crude hike is necessary; Texas' House of Representatives passed a bill urging OPA to raise crude price ceilings **(P. 20)**.

TRANSPORTATION: WPB approval of a second pipeline to the East **(P. 26)** fitted into pattern another of the projects through which the oil industry and PAW have increased shipments, improving the supply-demand balance as reported by P.I.W.C.'S economic committee **(P. 5)**. Greater contribution by rails to the East's supply was seen by John J. Pelley, president of the Assn. of American Railroads **(P. 28)**. Truckers were actively battling proposals to limit hauls **(P. 30)**. As parts pinch grew, WPB acted to give highest civilian priority to truck and car repair parts **(P. 32)**. ODT, acting to get newly manufactured tank semi-trailers into oil service, announced purchasers could amortize cost by writing it off against profits **(P. 34)**.

Army Would Take 'Spares', Cut Mileage

Rubber Director Jeffers dragged the synthetic rubber-100 octane battle for critical materials further into the open at an electrified point session of the House naval and military affairs committees but before the session ended the Army went to bat for aviation gasoline and the Navy spoke for the escort vessel program. The rubber director told of difficulties he was having in getting priorities for synthetic rubber plants **(P. 14)**, then he charged the Army and Navy wanted to "take the country off rubber". That opened the flood gates. Undersecretary of War Patterson jumped in with a you-ain't-seen-nothing-yet. He said these things should be done: (1) only absolutely essential use of passenger cars should be permitted; (2) commercial vehicle operation should be restricted to indispensible activities; (3) long-distance motor hauling of passengers and freight should be stopped; (4) civilian tires should be requisitioned and their purchase controlled; (5) spare tires on passenger cars should be purchased by the government; (6) passenger cars in excess of 20,000,000 should be purchased and the cars, aside from tires, scrapped; (7) percentage of reclaimed rubber put into truck tires should be increased **(P. 3)**.

Grim-faced after denying charges that Army-Navy "expediters" were holding up production was Undersecretary of War Patterson

Tough as nails was Undersecretary of Navy Forrestal's attitude on the witness stand before the House military-naval affairs committee

BELOW—About the only smile at the joint session of the House naval and military affairs committee was that of Rubber Director Jeffers (right)—and then only at the outset of the hearing when he was introduced to committee members (left to right): May, Ky.; Sasscer, Md.; Thomason, Tex., chairman

General News ... 3
Washington News ... 7
The Editor's Page ... 11
Associations ... 13
Refining News ... 14
Production News ... 19
Transportation News ... 26
Farm Equipment ... 36
Statistics ... 42
Markets ... 43
Personals ... 50

REFINERY MANAGEMENT AND PETROLEUM CHEMICAL TECHNOLOGY EDITION—In 2 Sections, Section 1

WATCH OUT, ADOLF!

—HERE COMES A GAS PUMP!

You and your gang won't recognize them, Adolf, but the gasoline pumps we once built for a peace-loving people have suddenly taken the form of death-dealing instruments of war. The skilled hands and trained minds that have made Tokheim an honored name in service station equipment are now dedicated to your complete destruction. In planes and guns and ships and tanks you'll find our handiwork, along with that of millions of our fellow countrymen who don't like you either. So watch out, Adolf — take cover, if you can—for gasoline pumps, motor cars, radios, refrigerators, and a thousand other American products are about to annihilate you and your chest-beating cohorts.

QUALITY
TOKHEIM
ALL OUT FOR VICTORY

Tokheim employees have pledged 100% participation and 12% of payroll for purchase of War Bonds.

TOKHEIM OIL TANK & PUMP CO.
DESIGNERS AND BUILDERS OF SUPERIOR EQUIPMENT
FORT WAYNE FOR 42 YEARS INDIANA

"The Butcher, the Baker, the Candlestick Maker..."

EXCELLENT WARTIME CUSTOMERS

MANY a business man is beginning to realize that when his trucks "fold up," so will his business—and he's more than anxious to hear *how* and *where* his trucks can be kept in top condition.

Through the U. S. Truck Conservation Corps, the ODT is doing a great deal to educate America's truck owners to the *need* for proper preventive maintenance.

But the job of *selling wartime maintenance to the "small business truck owners"*—the butchers, bakers, grocers, florists, cleaners and other business men who must keep their trucks in operation—can be done only by those who *know* the truck owner and *know* preventive maintenance. No group serving or selling the "small business" truck market is doing a better job on this than the oil companies. Key service station operators are in a unique position to show these men that preventive maintenance will not only keep their trucks running, but will help cut down their operating costs. At the same time, those stations are building a steady source of business for a long time to come.

Present-day gasoline rationing and restrictions on passenger car use mean that the commercial market offers a growing percentage of sales—and a growing percentage of opportunity. If you have not already started a program to cooperate with ODT in the "small business" truck field, do it now. If the experience of Ethyl fleet engineers and field representatives can serve you in planning your program, please call on them.

ETHYL CORPORATION
Chrysler Building, New York, N. Y.

Manufacturer of antiknock fluids used by oil companies to improve gasoline.

NATIONAL PETROLEUM NEWS—February 3, 1943—Vol. XXXV—No. 5
Published every week at 1213 West 3rd St., Cleveland, Ohio, U.S.A. Subscription rate $5.00 per year in United States, Mexico, and Pan-American countries; $6.50 Canada and foreign countries. Entered as second class matter Jan. 17, 1910 at Cleveland, O., post office under act of March 3, 1879, by The National Petroleum Publishing Co.
Copyright 1942 The National Petroleum Publishing Company.

Ed Moore . . . Democratic Oil Man Who Became 'Republican' Senator

SHORTLY after Ed Moore's election last November to the U. S. Senate, a fellow Oklahoma oil man was joshing him about the frequent shots at his "great wealth" which the opposition took during the campaign.

"Yes," deliberated the 71-year-old "baby" senator, "I do have great wealth—in the many friends and the several thousand workers I've employed at times, and the satisfaction in what I've contributed to the national wealth."

Mr. Moore probably hadn't figured up just how much he had added to the national wealth. But a figuring friend of his puts it at 1,000,000,000 bbls. of oil—in crude already taken out and in known reserves in the fields he opened up. An independent producer, he was the discoverer of the Fitts Pool in Oklahoma.

What he made from his discoveries didn't always stick, and "starting again" is no new experience to him. He is said to be "out" of the oil business now, his principal concern being his 10,000-acre ranch near Okmulgee, where he breeds Hereford cattle.

Speaking of financial ups and downs, he told a friend recently that if he can "leave the world even" he'll be satisfied.

Mr. Moore is a one-man crusade against the term "wildcatter". He says it sounds too irresponsible, too much like gambling. Yet when he went into the Fitts Pool country he sunk his first well against all the geological dope of the times.

Ed Moore

Mr. Moore comes to the Senate as a Republican, in spite of the fact that he has been a life-long Democrat. All through his campaign, which was a whirlwind affair of 49 days, he continually referred to himself as a Democrat, and declared he was in the race on the Republican ticket because he was against New Deal conditions.

The Republicans drafted him, when their nominee, former Sen. William B. Pine, whom they had picked to beat Josh Lee, died soon after the summer primary.

The only other public office Mr. Moore has ever held—or sought—was city attorney of Okmulgee, back in the days when Oklahoma was Indian Territory.

He comes to the Senate, his friends say, "untrammeled by any political or patronage commitments". And he jokes at political aspirations for a man 71 years old.

Like the motive that led him to enter the Oklahoma senatorial fight, Mr. Moore arrives at the Senate as something of a crusader. It was the same spirit that led him in 1940 to serve as state manager of the Willkie Democrats.

As a crusader he is crusading for some rather old-fashioned notions: he believes that a man in public office should know something about the job he's appointed to fill, and he objects to wasting public money.

As a Jeffersonian Democrat, Mr. Moore is anti-New Deal—a champion of free enterprise and an enemy of bureaucratic "legislation".

After his election, he said the first job is to win the war, and after that to assure a return to the traditional American form of government and enterprise. His friends look for free play of his talent at picturesque phrase-making and piercing wit.

He is expected to be in the forefront of any legislation dealing with oil, for he knows the oil business in all branches.

With Mr. Moore in Washington and serving as his secretary is Harry Wirick, who for years has been associated with him in the oil business.

Mr. Moore was born on a farm in Nodaway County, Mo., where he went through the rural schools, and later got some high-schooling at Barnard, Mo., while working as a farm hand. Then came 2 years at the state normal school at Chillicothe, Mo., followed by 5 years of teaching, with studying law in spare times. After a few months' practice at Marysville he moved to Okmulgee, which has been his home since.

No "gentleman farmer" is Mr. Moore. Farming with him pays its way. His work with Herefords, like that of other oil men turned ranchers, has gone a long way to building up cattle breeds in the state.

NATIONAL PETROLEUM NEWS

VOLUME 35 WEDNESDAY, FEBRUARY 3, 1943 NUMBER 5

Army Would Cut Car, Truck Use

Requisitioning of Spare Tires, All Cars Over 20 Million, Ban on Pleasure Driving and Slice In Truck Use Needed, Army Says

NPN News Bureau

WASHINGTON — An Army 7-point program for the civilian conservation of rubber, including such far-reaching features as the purchase or requisition of all passenger automobiles in excess of 20,000,000 and the elimination of long distance hauling of passenger and freight by commercial motor vehicles, was revealed at the joint session of the House military and naval affairs committees Feb. 1.

The program was outlined in a letter dated Dec. 8 from War Undersecretary Patterson to Rubber Director Jeffers, and its disclosure followed an accusation by Mr. Jeffers before the committee that the military was attempting to "control the the civilian economy".

Both Undersecretary Patterson, who followed Mr. Jeffers on the stand, and Navy Undersecretary Forrestal, who appeared later, hotly denied the charge. Mr. Forrestal asserted that he himself would not favor such control by the military on the ground that the military might be "warped" in favor of their own needs for critical supplies.

Mr. Jeffers had quoted matches from the Patterson letter to support his contention that the military sought to control civilian economy, a step that would result in "domestic collapse".

Mr. Jeffers accused the Army of wanting to "take the country off rubber". He agreed that the Army and Navy need rubber but declared "we can't take the country off rubber without a civilian collapse". The job of the Army and Navy, he said, is "to fight and not run the civilian and domestic economy".

Mr. Patterson, however, produced the full letter, and deleting figures of military secrecy, read it into the record. Here are the 7 points:

1. With respect to passenger automobile use, rationing regulations should be revised to prohibit passenger automobile use except for absolutely essential purposes. Under this head, Sunday and holiday driving other than for war work and other essential purposes should be stopped. Sunday travel by passenger autos is heavy under rationing. The ban on Sunday driving worked well in the last war.

"2. With respect to commercial motor trucks, operation should be restricted to indispensible activities. Trucks are still operating as if there were no rubber shortage, and they are still drawing tires freely for replacement. We still see plenty of trucks transporting beverages and luxury articles.

"3. Long distance hauling of passenger and freight by commercial motor vehicles that use up rubber should be stopped.

"4. Civilian rubber tires should be requisitioned, and the purchase of these tires should be controlled to see that they are used for essential activities.

"5. The fifth or spare tire on passenger cars should be purchased or requisioned. Such tires could be used to meet emergencies resulting from punctures, and so forth.

"6. Passenger autos in excess of 20,000,000 should be purchased and the tires now in stock should be requisioned for essential uses or converted into reclaimed rubber. The cars, aside from the tires, will be available for metal scrap.

"Among the autos so acquired should be the more than 3,000,000 held by families having more than one passenger auto, as well as the large quantity of used cars held by dealers in used cars.

"7. The percentage of crude rubber put into tires manufactured for trucks and buses should be appraised and the percentage of reclaimed rubber put into such tires should be increased."

Mr. Patterson, in his letter, acknowledged that "these measures are more drastic than those recommended in the Baruch report. But the situation today is more acute than the situation envisioned last September, as you have pointed out in your report, and I believe that additional measures are called for."

Complete Joint Use Survey

NPN News Bureau

CHICAGO—Subcommittee on joint use of marketing facilities for District 2, headed by H. T. Ashton, St. Louis, Socony-Vacuum, has completed field surveys at 19 points over the district and is now summarizing the data for further study, NPN learned Jan. 28.

Study Fuel Oil Delivery Cost

NPN News Bureau

NEW YORK—Subcommittee of District 1 marketing committee to study increased costs of tank wagon fuel oil deliveries met here today and mapped program for obtaining operating cost figures from 50 representative fuel oil marketers along the Atlantic Seaboard. Chairman of the group is A. W. Rowe, Cities Service.

Offers Coupons To Replace Credit

NPN News Bureau

LOS ANGELES—As a substitute for retail credit at service stations, Standard Oil Co. California is offering coupon books which may be bought for cash and used later for purchasing petroleum products, the company announces. Customers can buy these books at all company outlets.

BUTADIENE PROJECT CANCELLED

NPN News Bureau

WASHINGTON — Both Indiana Standard and Houdry Process Corp. officials decline comment on reports of cancelling 45,000-ton butadiene project, using Houdry process, at Wood River, Ill., involving conversion of some of Indiana Standard's refining facilities there. They referred all inquiries to Rubber Director Jeffers, who was not available for comment. Mr. Jeffers on Feb. 1 told a congressional committee that "one big" project was to be dropped because it will come into production too late due to priorities situation.

Crude Hike 'Out'

OPA, on Basis of Tariff Commission General Crude Advance. OPA State-Survey , Finds No Justification for ment Stymies P.I.W.C. Study Report

NPN Staff Special

WASHINGTON — Showdown on crude prices is developing with OPA publicity stating there is no justification for higher prices, and P.I.W.C. debating what action to take on its exhaustive study of crude costs and effect of prices on reserves.

If there was a race between OPA and P.I.W.C. in placing information on the altar of public opinion, the OPA won. There is wide suspicion in the industry that it was more than coincidence in timing of OPA's releases to the public a day before P.I.W.C met.

P.I.W.C. committee studying crude costs and crude prices was expected to report Feb. 2. Tariff Commission report was made public Jan. 27, nearly a week before, and OPA issued a formal announcement on Feb. 1 saying it could find no justification in the commission's report for a nationwide crude price increase.

It is safe to say most of the P.I.W.C. members favor higher crude prices, but how far they will go in registering their opinion—especially in the face of OPA's public statement—remains to be seen.

Says Present Prices High Enough

OPA said present prices could be continued and return profits "which must be considered adequate in wartime." But OPA was careful to say it would consider price adjustments locally or regionally, taking cognizance of the possibility of abnormal conditions, local shortages, uneconomic price structures, and higher costs of new production.

Stripper wells, OPA said, generally are not now operated at a loss and there will be few instances in which higher prices would be justified on the ground that they would result in more oil from marginal operations.

One of the major points of criticism against

(*Continued on p. 7*)

Eastern Stocks

A.P.I. To Begin Publication of Index On Status of Oil Stocks on East Coast

NPN News Bureau

NEW YORK—American Petroleum Institute has announced that its weekly news report, beginning with the report for Jan. 30, will include a tabulation showing by index numbers the petroleum stock situation on the East Coast.

The index numbers are based on the average normal stocks for the period 1940-1941, adjusted for seasonal fluctuations. All military stocks and products and other physically unavailable stocks are eliminated from the calculation of the index.

Development of the index followed studies by A.P.I.'s department of statistics, reviewed by PAW, A.P.I. President Boyd said. He said both the A.P.I. and PAW were greatly concerned over the fact that figures on east coast supply could no longer be made available publicly because of military secrecy. So, to give eastern residents at least an accurate description of the net domestic supply as reflected in the trend of inventories, without revealing any military information, the index was devised.

When the index reaches 50, "it means a serious condition of shortage" and if it falls below 40 "there are bound to be some localities in which some products are not available in the quantities necessary to meet local demand", the A.P.I. explained. As of Jan. 23, the index was 35.3.

Index numbers showing the trend since July 4, 1942, follows:

Index Numbers as of Dates Indicated

July	4, 1942	51.7	Oct.	17, 1942	57.5
	11,	54.3		24,	56.1
	18,	52.6		31,	57.9
	25,	53.1	Nov.	7,	58.3
Aug.	1,	53.1		14,	58.0
	8,	54.5		21,	58.5
	15,	54.8		28,	57.3
	22,	55.9	Dec.	5,	53.3
	29,	58.7		12,	51.7
Sept.	5,	59.1		19,	46.0
	12,	60.1		26,	42.0
	19,	59.8	Jan.	2, 1943	41.2
	26,	59.6		9,	38.4
Oct.	3,	59.6		16,	36.3
	10,	57.3		23,	35.3

Explaining the index, A.P.I. said:

"A master curve, corrected to eliminate certain obvious deviations from normal, has been drawn showing the average stocks of gasoline, distillate fuel oils and heavy fuel oil at refineries, in transit, and at principal terminals on the East Coast . . . . for each week of the years 1940 and 1941. This represents an approximately normal stock situation . . .

"Each week the current available stocks of these products will then be calculated on this same basis and divided by the normal available stocks for the corresponding weekly average for 1940-1941. The resulting index number represents essentially the current available east coast stocks as a percentage of normal for that week."

The A.P.I. pointed out that in interpreting the index it is important to recall that the seasonal stock curve for the industry normally shows a decline during the fall and winter and a corresponding buildup during the spring and summer. If this process occurs at normal rate, the index number will not change. It is possible for the index to decline although stocks are actually rising if the rise is not as swift as normal.

Illinois Legislature To Probe OPA's Fuel Oil Rationing

Special to NPN

SPRINGFIELD—Resolution for appointment of joint legislative committee to investigate OPA fuel oil rationing in Illinois passed the State Senate Jan. 27, according to Sen. P. Benson, one of the sponsors. Bill goes to the House for consideration.

Originally introduced Jan. 12, new teeth were given resolution before passage by inclusion of right of subpoena of witness.

Aetna Purchases Properties Of Kentucky Independent

Special to NPN

LOUISVILLE, Ky.—Acquisition of the properties of the Kentucky Independent Oil Co., Lexington, Ky., has been announced by Aetna Oil Co., headquarters here.

Included in the deal were 6 bulk plants and over 150 retail outlets in 18 central Kentucky counties. This places Aetna third in the state in point of gasoline distribution, officials of that company state.

Operation of the combined properties will continue on a commission agency basis under the name of Mahan, Bakhaus and Burke. Jim Mahan was formerly Aetna's Lexington manager and O. H. Bakhaus and Dudley Burke operated the Kentucky Independent Oil Co., which they founded in 1936 and built up to one of the largest oil jobbing companies in the state. Bakhaus, president of the Kentucky Petroleum Marketers Assn., is now a captain in the Army.

Ohio Oil Starts Employment Of Girls at its Stations

NPN News Bureau

CLEVELAND — Ohio Oil Co. is joining some other oil companies in the hiring of girl service station attendants, it is disclosed in the current issue of *The Runner*, company publication.

"The fact that women are going to work in Marathon stations may be news to most of you, but it's true," *The Runner* states, adding that the plan is being tried out first in Indianapolis "and if successful there it will be enlarged to include the other territories."

Miss Helen Billstone, formerly of Ohio Oil's home office at Findlay, is supervising this branch of station operation. Girls employed are to be put through a company training course before they are released for actual service.

John H. Tucker Dies

John H. Tucker, 58, general superintendent of production for Gulf Oil Corp. at Houston, died in a Houston hospital Jan. 22. He had been engaged in the oil business all his life, first coming to Texas in 1904 with the J. M. Guffey Petroleum Co. (later Gulf) as field foreman. He became assistant superintendent of production for Gulf at Beaumont in 1908, and was promoted to superintendent in 1913, the position which he held at the time of his death.

U. S. and Britain Collaborate On Oil, Tanker Problems

NPN News Bureau

WASHINGTON — International discussions of tanker and other petroleum problems to further collaboration between American and British governments are being sponsored by the U. S.

Announcement that a British mission is visiting Washington was made Jan. 30 by PAW Ickes, who said the group would meet with American agencies and other English missions concerned with petroleum.

"Close collaboration already exists between the U. S. and British governments on the organization of oil supplies for the war theater throughout the world and the purpose of this visit is to aid this collaboration and the coordination of future plans by personal contact and discussion between the men who are actually doing the work in both countries."

British mission is composed of Geoffrey Lloyd, M. P., chairman of the British Oil Control Board and Petroleum Secretary; F. C. Starling, director of petroleum supplies; T. H. Humphreys, director of the tanker division, Ministry of War Transport; and Sir Frederick Godber, member of the Trade Control Committee.

Would End Pipeline Discrimination

NPN News Bureau

WASHINGTON—Rep. Izac, Calif., introduced a bill in the House Jan. 26 to prohibit interstate common-carrier pipelines from transporting commodities in which such carriers have any interest. The bill is designed to protect interstate commerce in petroleum products from discrimination by common carrier pipelines in producing, refining and transportation. The bill (H. R. 1516) was referred to the interstate and foreign commerce committee.

Approve Northwest Fuel Oil Ration

NPN News Bureau

WASHINGTON—OPA's authority to ration fuel oil was extended today to Oregon and Washington with an amendment to WPB's Supplementary Directive 1-0 which gave OPA the power to ration fuel.

New Agency to Develop Farm Rubber Gallagher Offered District 5 Post

NPN News Bureau

WASHINGTON — Position of director-in charge for District 5, with headquarters at Los Angeles, has been offered to Herbert R. Gallagher, formerly president of Consolidated Oil Corp. (Sinclair), according to a PAW spokesman.

February Tire Quotas Given

NPN News Bureau

WASHINGTON—February tire quotas are about the same as those for January, OPA announced Jan. 27. Quotas follow:

Type	February	January
Passenger cars:		
Recaps	851,125	800,000
Grade 1 tires	161,000	161,000
Grade 2 tires	225,500	230,000
Grade 3 tires	690,475	690,000
Inner tubes	759,000	709,336
Trucks:		
Tires	345,122	345,307
Recaps	345,065	368,200
Farm tractors, implements	57,961	21,000
Tubes	298,935	335,863

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

WASHINGTON BUREAU, 1034-36-38 National Press Bldg. • Telephone National 3477 • A. M. Petty, News Editor and Chief of Staff

Supply-Demand Balance Improved

Eastern Situation Better, but Stocks Must Be Drawn Upon for About 6 More Weeks, P.I.W.C. Committee Reports. Urges Yields Adjustment

WASHINGTON—Pleasure driving on the East Coast should be restored as soon as the shortage eases, which may be in the latter part of March, P.I.W.C. economics committee reported Feb. 2.

District 1 supply has been brought more into balance with demand by increases in petroleum deliveries and recent drastic consumption curbs, but stocks still will have to be drawn on to supply civilian needs. The shortage will continue at least for the next 6 weeks, the committee said.

Refinery yields still are out of alignment, with a growing shortage of residual fuel and steady "undesirable" accumulations of gasoline, the committee found, blaming the maladjustment on OPA failure to change price ceilings to give refiners an incentive for making more lower priced products.

Sees Lower Crude Runs

Again citing the lack of balance between refinery runs and yields in Districts 1, 2 and 3, which it asserted was interfering with maximum production of war products, the committee said continuation of the maladjustment would mean that reduced crude runs, caused by limitations on consumption and transportation shortages, would fall to the lot of Districts 1 and 3.

Under consideration as a remedial measure, the committee said, is a slash in District 2 refinery runs which would throw the emphasis on shipments to District 1 from product to crude, and at the same time increase product outlets for Districts 1 and 3.

Pointing out that its report this month is of a "short term nature covering the remainder of the critical winter period", the committee estimated that average daily deficit between supply and demand in first quarter of this year would be 72,000 bbls., which is 129,000 b/d below that forecast in the last report. The big slash in projected daily shortage, committee said, is outgrowth of improved transportation and lessened consumption.

Estimates Savings

Lessened demand will result in a saving of about 36,000 b/d in gasoline consumption, mostly due to driving restrictions, and 59,000 b/d in fuel oil consumption, stemming from reduced coupon values, less fuel for nonresidential heating, and recent allocation orders for fuel oil and asphalt consumption.

Nevertheless, committee found that reduction in coupon values from 9 to 8 gal. and from 90 to 80 gal. in New York and adjacent states "is unnecessary and rather inequitable to that area" (*see story on p. 7*).

If driving restrictions are to be turned to advantage, gasoline transportation facilities must be diverted to fuel oil and the prohibition against tank car shipments of gasoline to District 1 continued through February and possibly March. Too, gasoline output by District 1 refineries must be held to the minimum, the committee continued.

Most serious eastern shortages, the committee added, are in kerosine and residual fuel.

Whether shortage is eased in latter part of March hinges upon 2 important factors—the weather and the military, said the committee which urged that emphasis be put on summer stockpiling to protect industry next winter against "depleted" supplies that existed last fall.

While a decision will not be made until May on extension of the 20-in. products pipeline to the East Coast, the committee said "all indications point to the justification of the extension of this line on to the East Coast."

Turning to unbalanced refinery yields in Districts 1, 2 and 3, the committee said that during 7 week period between Dec. 5 and Jan. 23, when there was a tendency toward overproduction of gasoline and a "pronounced lack" of residual fuel oil, District 2 accumulated gasoline at the rate of 130,000 b/d with stocks on Jan. 23 about 4,500,000 bbls. higher than previously forecast as required for that date.

The extra fuel oil that could have been shipped to the East Coast during that 7 week period might have been about 1,500,000 bbls., or 30,000 b/d, the committee added.

Table contained in the committee's report showing differences between supply and demand for first quarter is shown on this page.

District I—Summarized Estimates of Supply and Demand Situation
(Thousands of Bbls. Daily)

	Dec. 1942	Jan. 1943	Feb. 1943	Mar. 1943	Average 1st Q.
Presently Anticipated Deliveries Supplies					
Local Production	77	78	79	78	79
*Receipts by Rail (Incl. effect of War Emergency Pipeline)	741	791	826	881	832
by Pipeline	158	166	186	198	183
by Barge and/or Tanker	182	180	152	177	171
Total Supply	1,159	1,215	1,243	1,334	1,265
Presently Anticipated Total Demand (Basis of Restriction to Jan. 25)					
Local and Export					
Gasoline	471	442	453	451	449
Kerosine	147	156	155	138	149
Distillate Fuels	392	363	316	277	319
Residual Fuel	335	283	306	301	297
Other	71	105	95	98	100
To Other Districts	26	23	23	23	23
Total Demand	1,442	1,374	1,348	1,288	1,337
Resultant Required Changes in Stocks	—283	—159	—105	—46	—72

* Estimates of the P.A.W. Division of Transportation.

Revision of PAO No. 1 Under Study by PAW

WASHINGTON—PAW is considering revision of PAO No. 1 to require primary suppliers to distribute their available supplies equitably among secondary suppliers and other customers they served in 1942, giving preference, however, to Army, Navy and others entitled to preference under any priority order.

Such a step would halt "raids" on primary suppliers by peddlers and others who, holding the coupons, have been demanding supplies under OPA's so-called non-discrimination order. This has resulted in draining stocks of some suppliers so that they have been unable to take care of their regular customers.

Secondary suppliers, who are unable to obtain supplies because their primary suppliers are out of business, could appeal to the PAW district marketing director for relief and he could designate one or more suppliers to supply such secondaries, according to the new version of PAO No. 1 being considered by PAW.

Industry representatives have been complaining that PAO No. 1 quotas conflicted with quotas set under PAW Directive 59, as well as with OPA's coupon system and OPA's so-called non-discrimination order.

Headline Maker

DeGolyer Tells Council of State Governments That Fuel Oil Rationing May Become Nationwide. Predicts Pleasure Driving Ban Will Continue All Summer

WASHINGTON — E. L. DeGolyer, assistant PAW deputy, went to Baltimore to substitute for PAW Ickes who was scheduled to speak before the Council of State Governments Jan. 26. It was a rush call. Mr. Ickes had developed a sore throat.

Mr. DeGolyer didn't have a prepared speech but he was ready and willing to talk about petroleum reserves and how they can be best conserved—that's his specialty. But the state officials didn't want that. They wanted to know more about fuel oil rationing and the "pleasure driving" ban. And, Mr. DeGolyer being an assistant deputy petroleum administrator, was "in the know" enough to oblige.

As a result, several of Mr. DeGolyer's observations made newspaper headlines.

Predicts Nationwide Fuel Oil Ration

Mr. DeGolyer led off by saying that the time was not far off when fuel oil rationing would be extended nationwide.

Back in Washington, a PAW spokesman qualified a little bit on the extension of fuel oil rationing by saying such a plan was "still nebulous".

On the "pleasure driving" ban, newspaper reports had Mr. DeGolyer saying (1) there was no hope for early relief from the "pleasure driving" ban; and (2) the "pleasure driving" ban would last through the summer at least. When questioned, Mr. DeGolyer said: "Well, I guess you can say either statement is true as far as I am concerned."

Mentioned also at the Baltimore meeting by Mr. DeGolyer was the necessity for increasing the nation's production of oil. On this, he said measures were being taken to increase wildcat drilling 50% over any previous year. However, no definite means have been established—such as a crude price hike or government subsidy—to accomplish this, PAW said. Mr. DeGolyer's statement was said to be more of a hope than an actuality.

ODT Seeks Men Experienced In Tank Car Shipping

WASHINGTON—A handful of men experienced in tank car transportation is being sought by the ODT.

Tentative plans call for five men experienced in railroad operation and traffic, or in petroleum shipping by tank car; two men familiar with alcohol and chemical transportation; at least one with a thorough traffic and transportation background, specializing in petroleum and other liquids; and another who knows tank car transportation of liquids other than oil. Seven others with general tank car experience are also sought.

These men are being recruited through field offices, it is understood.

Fiddling at Birthday Celebration Isn't Pleasure, Says OPA

WASHINGTON — OPA Administrator Brown believes the Eastern ban on pleasure driving is both legal and necessary.

His Jan. 29 announcement coincided with an OPA statement that entertainers on Presidential Birthday Ball programs could travel in private cars without violating the ban.

WPB Lists Anti-Freezes Said to Damage Engines, Radiators

WASHINGTON—A partial list of "deleterious anti-freeze solutions" which it is claimed may damage automobile engines has been made public. Brands were listed by Bureau of Standards and the list, admittedly incomplete, was published by WPB.

The offending solutions contain calcium chloride and other salts, Bureau of Standards said in a Jan. 27 announcement which was separate from the WPB listing of the products.

"The most serious damage caused by the chemical action of these brine solutions is the hidden corrosion which develops in the cooling system of the vehicle," said a Commerce Department announcement containing the Bureau's warning against use of solutions containing salts.

Claims Leaks Develop

"Water pumps and cylinder heads develop leaks which are not detected until serious damage has been done to these vital parts. The salt solutions also damage radiators, particularly those made of copper."

WPB said following is a text of a letter from Bureau of Standards to WPB identifying "deleterious anti-freeze solutions":

"According to information furnished to us by the manufacturer or according to our laboratory tests, the following brand-named products constitute 'deleterious anti-freeze solutions' as defined in the War Production Board Limitation Order No. L-258 issued January 20, 1943 (the date of our most recent analysis is shown for each product which we have analyzed):

Brand Name	Manufacturer	Address (City)	Date tested
All-Winter	All Winter Anti-Freeze Co.,	Columbus, Ohio	May 1942
Bird Antarctic	Bird Antarctic Anti-Freeze Co.,	Bloomfield, Iowa	Jan. 1943
Bond (Top Line)	Tenn. Valley Associated Marketers,	Nashville, Tenn.	Jan. 1943
Chem-A-Cool	Chem-A-Cool Co.,	Columbus, Ohio	May 1942
Ever-Flo	Ever-Flo Anti-Freeze Co.,	Cleveland, Ohio	Jan. 1943
Flexo	American Chemical Co.,	Atlanta, Georgia	Sept. 1942
Fre-Zex	Research Manufacturing Corp.,	Boston, Mass.	Jan. 1943
Frozone	Bryce Chemical Industries,	Chicago, Ill.	Sept. 1942
Gold Seal	Gold Seal Mfg. Co.	Brooklyn, N. Y.	Nov. 1942
No-Freeze	Great Northern Chemical Co.,	Oak Park, Ill.	Sept. 1942
Permazone	Midwest Chemical Corp.,	Topeka, Kansas	.....
Security	Morco By-Products Company,	Chicago, Ill.	Sept. 1939
60 Below	Freedom Chemical Company,	Cleveland, Ohio	Nov. 1942
Wonder-Solv	Miller Manufacturing Company	Camden, N. J.	Jan. 1943

"The above list is known to be incomplete, as it only covers those products on which we already have firsthand information. Chem-A-Cool, No-Freeze and Permazone are petroleum fractions. The other eleven products listed are salt solutions."

Regional OPA Chiefs Get Power to Set Fuel Oil Priorities

WASHINGTON — Emergency powers to establish priorities for all consumers of fuel oil in the 17 East Coast states have been handed to OPA's regional administrators, but OPA said they "would be expected to conform to PAW priorities".

As explained by the rationing agency, the difference between OPA and PAW fuel oil priorities is that the OPA men are empowered to outline the degree of preference to be shown all types of fuel oil users while PAW's Schedule A affects only fuel oil consumed for non-heating purposes by commercial, industrial and governmental users.

To Recognize PAW List

In inaugurating a priority list, an OPA spokesman said, the regional administrators will be required to place PAW's Schedule A at the top of the list and work from there on down.

OPA made it clear the emergency powers gave regional administrators the right to establish priorities only for "limited periods" and on the East Coast alone. Administrators having jurisdiction in the area are located in Boston, New York, Atlanta and Cleveland.

In addition to listing priority of use, the administrator may limit the amount of oil a consumer may buy at one time and may specify hours of delivery.

The delegation of power was in the form of Amendment No. 33 to Ration Order 11, effective Jan. 27.

U. S. 'Gas' Tax Income Drops

WASHINGTON — Gasoline tax collections during the last half of 1942 showed almost a 20% drop under the same period of 1941, totaling $169,106,095 compared with $202,008,701, Bureau of Internal Revenue reported Jan. 27.

For the month of December, gasoline tax collections totaled $28,453,074 as compared with $29,288,191 the same month in 1941 but lube oil tax collections totaled $3,527,979 as compared with $2,905,961 in December, 1941.

General Crude Hike Is 'Out'—OPA

(*Continued from p. 3*)

the Tariff Commission report—that it did not cover higher exploratory costs—was met by the OPA assertion that studies are being made to separate exploratory from other production costs, but the agency emphasized it has argued in the past that higher prices are not a "proper" solution.

Asserts Prices are Higher

Asserting the commission's report "clearly indicates" price per bbl. and margin costs are greater than in recent years, OPA told the public their fuel bill would be $14 000,000 more a year if even 1c a bbl. was added to crude prices, and said a price hike of as much as 50c per bbl. had been proposed.

If there is a sound case that can be made for higher crude prices, OPA said it remains to be made.

OPA's announcement said:

"The Tariff Commission analysis, it was stated, indicates that continuation of present crude prices—including the special price increases already granted in some fields and for various areas—will enable the majority of producers to absorb any increases in production costs and maintain a margin of profit which must be considered adequate in wartime . . . . .

"In some known oil pools where abnormally low prices prevail, higher prices may be necessary to cover the costs of new drilling, OPA officials stated, and the agency is willing to make adjustments where they will result in bringing more oil to market to meet specific needs But, it is contended, neither the public, the government nor industry can be further burdened with staggering oil bills simply because some producers are not realizing all of the profits they might have once enjoyed."

* * *

Brown Finds Much Wanting In Crude Cost Survey

NPN News Bureau

WASHINGTON—An undertone of dissatisfaction with the Tariff Commission's study of crude production costs runs through a restrained statement issued by Russell B. Brown, general counsel of the Independent Petroleum Assn. of America, who points out that while the study ended with the third quarter of 1941, OPA froze crude prices as of October, 1941. Sept. 30, 1941, "is not a fair place to end a survey, whether it be on farming, producing oil, or setting the family table," he declared.

The report, he said, is historical, fails to cover the cost of finding new reserves or replacement cost of oil sold, and leaves out other important items "generally recognized as essential to cost studies" such as interest.

"The Tariff Commission, created as an independent agency, has been recognized as a fair and impartial agency. It is unfortunate that it did not make this study as an independent group, but collaborated with an interested group which was the Office of Price Administration, whose repeatedly avowed purpose has been to keep prices stationary," Mr. Brown charged.

'Of Historical Value'

Although the study contained much that will be of value historically, he added, the report was made for the Office of Price Administration and a similar study might have been "more conclusive and comprehensive" if it had been made for the petroleum industry.

Assuming the report was the result of a survey announced by OPA late in 1941, Mr. Brown said the "first impression" indicates the Commission was able to obtain factual information from only 2534 producers while there are 19,000 in the U. S.

The companies covered produced 70% of U.S. oil, but the report indicates the Commission reached only the larger companies. This conclusion is emphasized by the fact that the Commission reported daily average production per well for the companies covered as 13.7 b/d while U.S. production per well averaged 9.4 bbls., he said.

Mr. Brown made clear his remarks were based on a preliminary study of the report.

Higher Retail, Jobbers Margins Reported 'Cooking' at OPA

WASHINGTON — Increased margins on gasoline for jobbers and retailers are near the top of OPA's docket but it is still uncertain just when the long-awaited step will be taken. And OPA is close-mouthed about how much the increase will be. It will probably be handled on a regional basis with East Coast getting first attention.

OPA plans to extend soon its price increase formula on blended heavy fuel oils to Gulf Coast (which means adjustment of New York Harbor prices, too) and to mid-western areas not covered in first order (*see NPN, Jan. 27, P. 15*).

Recommendations for price increases in heavy crudes of Wyoming and heavy crudes and residual fuel oils of California have been sent by PAW to OPA which has referred them to U.S. Tariff Commission for comparison with the commission's recent study of crude costs and prices.

PAW Revises 'A' List of PAO 3

WASHINGTON—Farming and mining machinery and equipment today were added to Schedule "A" of PAO No. 3, changed to Petroleum Distribution Order No. 3, which was amended at the same time to exclude Florida, west of the Appalachicola River, from the area covered, and producers and processors of steel drums and gas cylinders were added to the schedule. The order also was interpreted to make clear that bakers are included in the schedule under Item 2.

Kerosine Deliveries Under Priority In New England

WASHINGTON—Priorities on kerosine deliveries in part of New England were set by OPA Regional Administrator Kenneth Backman, Boston, in an order effective from Jan. 29 through Feb. 7.

Order applied to Connecticut, Massachusetts, New Hampshire, Rhode Island and the Vermont counties of Bennington, Windham, Rutland and Windsor.

Placing a 25 gal. limit on each delivery, OPA said preference should be given, in following order, to consumers who use kerosine because: Of an emergency threatening life or health; their residential quarters have only space heaters; they live in buildings using kerosine in central heating systems; they have applied for but have not received a domestic cooking and lighting ration; and they use kerosine in industrial processes or operations to extent permitted by PAW.

Deliveries were prohibited to consumers who live in a building using other fuel for central heating; use space heaters in non-residential premises except grocery stores, drug stores, physicians offices, and restaurants not commonly regarded as places of entertainment or amusement; and consumers acquiring kerosine for industrial uses not approved by PAW.

4 Eastern States Receive Cut In Period 4 Fuel Oil Ration

WASHINGTON — Unit value of Period 4 fuel oil ration coupons used by householders has been reduced from 9 to 8 gal. in Rhode Island, Massachusetts, Connecticut, New York (except for the Adirondack region), New Jersey, and Pennsylvania.

Period 4 coupons used by commercial, industrial and other large users were reduced in the same region from 90 to 80 gal.

Cut was announced by OPA on Jan. 30, saying it was necessary because of tight supply situation and promising increase in value when supply improves.

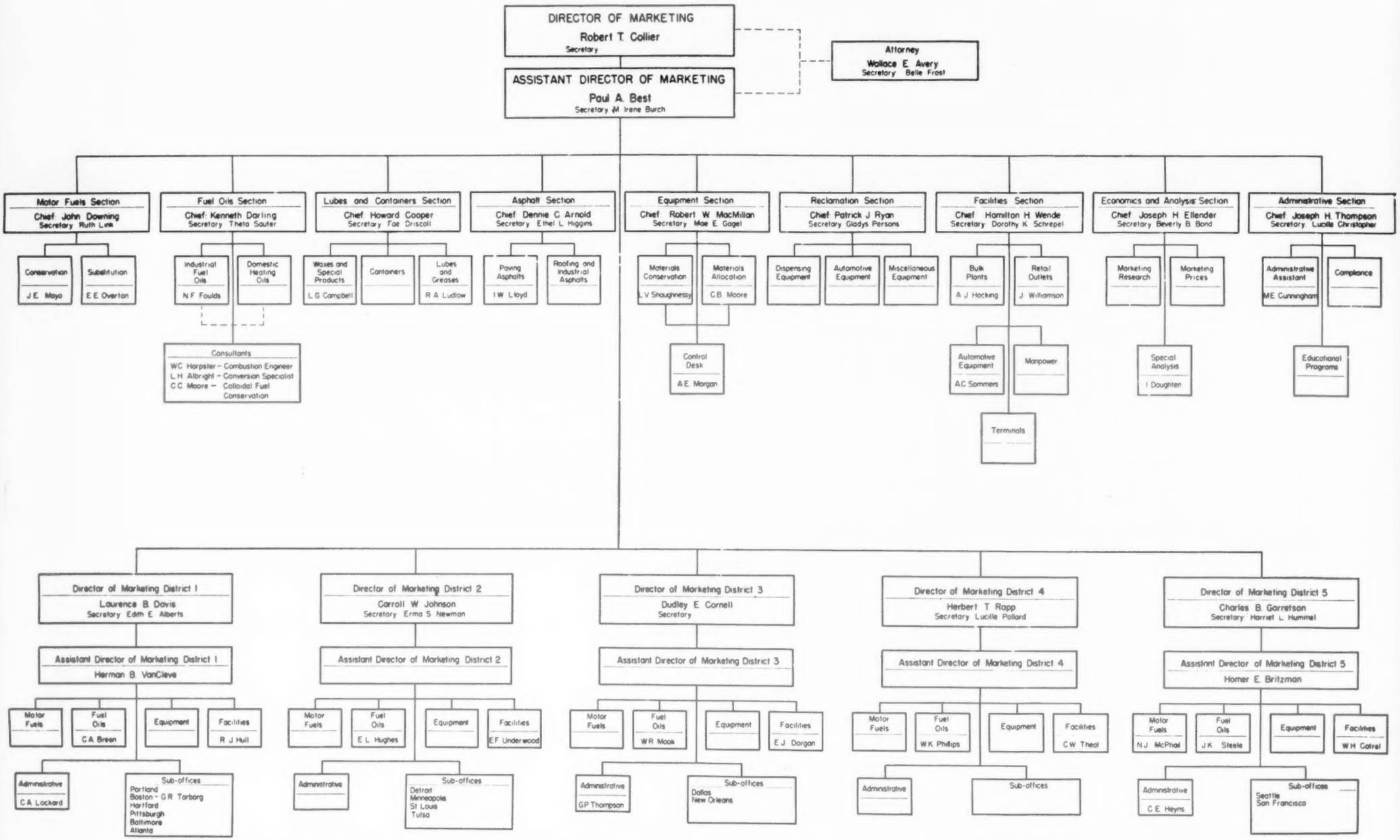
Says Navy Shares Oil in East

WASHINGTON—The Navy "has been and intends to continue sharing its stocks of petroleum with civilian authorities", said Undersecretary of the Navy Forrestal in a letter to Sen. Walsh, Mass., who made the letter public Jan. 29.

"In fact," Forrestal said, "in the month of January there has been made available to the Petroleum Administrator for War a substantial volume which we are advised has been most helpful in meeting certain localized conditions."

He gave no figures on how much of the Navy's stocks have been shared with civilian authorities already.

Petroleum Administration for War---Organization Chart for Marketing Division



Organization chart of PAW's marketing division shows the lines of responsibility of the various sections and lists the personnel directing each operation

Hugh M. Kent . . .

Heads PAW's Salvage Operations

If there is anyone in the Petroleum Administration for War who's pegged in exactly the right job it is Hugh M. Kent, chief of PAW's salvage section. He is doing the same job he did in private life—redistributing materials and equipment among oil operators.

Mr. Kent went into the second-hand equipment business at Los Angeles after drilling several dry holes. He decided luck just wasn't with him, and salvaged what he could from his inventory and used materials. At that he had right good luck. He got the idea of optioning material that the oil companies didn't need, then "peddling" it through an offering sheet which he circulated among operators.

That experience fitted him for his present job with PAW. He's doing the same thing now, even to circulating an offering sheet among the district committees. He finds out who has any used or surplus equipment they want to dispose of, then places it where most needed in the war effort.

"Prospects" reach him in many odd ways. A woman operator in the Southwest writes to the War Department, saying she has some drilling equipment that might be used somewhere. The letter is turned over to Mr. Kent. It seems to fit a request from Cuba for equipment for exploratory drilling in search of certain metals on that island.

Another day, a call comes from Defense Supplies Corp. for 17 bulk plants to ship up the Amazon River where the Brazilian government is expanding rubber production. To get all the tanks, pumps, pipe and other equipment from manufacturers would take time even with top-ranking priorities. Mr. Kent suggests buying up some abandoned bulk plants and moving them to South America. The governmental agency is willing. In a few days, he has located a major company glad enough to dispose of bulk plants it was closing anyway.

Again, a butane distributor asks for priorities on a 4000-gal. tank. That takes heavy steel, virtually unobtainable except for military use. But Mr. Kent has the happy thought that a pressure vessel from a dismantled refinery will do the trick. Sure enough, it does—with a little welding.

Helps Solve Equipment Problems

Many of Mr. Kent's "prospects" are applicants for priorities to obtain new equipment. PAW's priorities analysts almost automatically say "no" to such requests but they soften the blow by suggesting possibility of secondhand equipment. And many times, Mr. Kent's files have listed just the items sought.

But not all of his dealings are in used materials. For example, there was the Massachusetts oil supply house which wanted someone to take several thousand feet of unloading hose off its hands—and with no priorities rating required. By chance, an inquiry came a few days later from a Florida marketer who had vainly searched for truck and tank car unloading hose. PAW's salvage chief brought them together.

Another source of his "stock in trade" are quantities of "frozen freight" on docks and in warehouses which were orphaned by the war. This material was destined for foreign plants blitzed by the Nazis or Japs. First, Mr. Kent tries to find use for it in the foreign department; if not, then in domestic operations. And if there are still no takers, he turns it over to WPB for use by other industries or for scrap. Right now he is seeking some oil industry use for 30 tons of zinc plate which originally was going to a refinery in the East Indies.

Then there was the item of some 5000 drums of lubricating oils running up warehouse charges for many months because the buyer had been blitzed. Just about the time Mr. Kent heard of this he had an inquiry from Defense Supplies Corp. for drums to ship up the Amazon. And he disposed of the oil, too.

The PAW official has nothing to do with the actual selling, the price or any other arrangement; he just brings the parties together, with no commission charged.

Hugh M. Kent

Another project interesting Mr. Kent now is how to get back into use in the states those thousands of empty drums that line the Alcan (Alaskan) highway.

Typical of the reclamation programs planned by Mr. Kent is that for recovery of subsurface pump parts. Balls and seats of this equipment are made of alloy steel. At his suggestion, manufacturers now ask purchasers to turn in used balls and seats, just like the trade-in on toothpaste tubes. It has been found that many of these parts can be reworked; rest of them go to scrap.

Works With WPB Salvage Unit

As PAW's salvage man, Mr. Kent works with WPB's industrial salvage branch on programs for getting in scrap from the oil industry. Besides this, Mr. Kent is chairman of PAW's redistribution committee which aims at getting salvaged materials into proper channels. It is planned to have a representative of each PAW division on this committee. To date, following have been designated to serve on Mr. Kent's committee: Foreign division, A. H. Chapman; marketing division, R. W. MacMillan; transportation division, Donald F. Sears; refining division, Claud U. Marks; production division, Robert V. Shirk (temporarily); natural gas and natural gasoline division, R. W. Ducker; and materials division, (to be designated by Frank A. Watts, new director of materials division).

Mr. Kent was born at Wytheville, Va., but went to California in 1910 where he attended high school and college. For 15 years he was with the California Standard, then served several years with U. S. Bureau of Mines at its Bartlesville, Okla., experimental station. After that he was connected with the Gypsy and Prairie Oil Companies. He tried his hand at wildcatting himself but with no success. And sale of his inventory and used material led him into the equipment business. He came to Washington early last summer, starting in PAW's materials division under William F. Huff, then director.

WAR ORDERS for the OIL INDUSTRY

Every care is taken each week to list every order, rule and regulation issued by any war agency and applicable to all branches of the oil industry. Since these orders are so numerous, however, we will appreciate our readers' cooperation in letting us know when they feel that we have omitted a regulation.

Complete copies of the official text of every order on oil can be obtained from PLATT'S OIL-Law-GRAM, 1213 W. Third St., Cleveland, Ohio, a publication which reproduces and mails out the orders on oil immediately upon issuance. Minimum charge for single copies, $1, postage paid. One year's service, $75.

Code: AO—Administrative order; RO—Ration order; L—Limitation order; M—Conservation order; P—Preference rating order; PS—Price schedule; RPS—Revised price schedule; MPR—Maximum price regulation; GMPR—General maximum price regulation; Supp.—Supplementary; Reg.—Regulation; GO—General order.

The Week's Orders

(Orders issued from Jan. 23-30, inclusive)

RO—Ration Orders
- 50—Gasoline
- 11—Fuel oil

Pr—Prices
- GMPR—Price Control
- RPS 88—Petroleum
- MPR 137—Anti-freeze
- MPR 170—Anti-freeze

P Orderes
- P-98-b—Ratings
- P-98-c—Frozen materials

L Orders
- L-197—Steel drums
- L-199—Water heating tanks

M Orders
- M-133—Rotenone
- M-13—Rubber

T Orders
- T-1—Tank cars

Digest of Week's War-Oil Orders

OPA—Office of Price Administration

ANTI-FREEZE—PS 88—Dollar and cents prices set for kerosine, other distillates, naphthas, solvents and mineral spirits when used as anti-freeze substitutes; Am. 60 to RPS 88; issued 1/26, effective 2/1, expires 3/1.

MPR 137—Retail prices for above substitutes set; Am. 19 to MPR 137; issued 1/26, effective 2/1, expires 3/1.

MPR 170—Prices set for anti-freeze containing inorganic salts as principal ingredient; Am. 2 to MPR 170; issued 1/26, effective 2/1.

CRUDE OIL PRICES—PS 88—Determination of price ceilings clarified; Am. 63 to RPS 88; issued 1/28, effective 2/3.

Prices set for crudes from Texas, Louisiana, Arkansas and Kentucky pools; Am. 64 to RPS 88; issued 1/28, effective 2/3.

FUEL OIL PRICES—PS 88—Dollar and cents ceilings set for residuals and blends with distillates in Kansas, Oklahoma, Arkansas, New Mexico and Louisiana and Texas excluding Gulf Coast ports; Am. 62 to RPS 88; issued and effective 1/25.

Specific prices set for California heavy fuels; Am. 61 to RPS 88; issued 1/26, effective 2/1.

FUEL OIL RATIONING—RO 11 — Emergency purchases permitted for oil burning equipment when other equipment fails, or emergency transfer allowed up to 50 gal. in case of threat of life, health or property; Am. 30 to RO 11; issued 1/26, effective 2/1.

Rations for house trailers doubled; Am. 31 to RO 11; issued 1/28, effective 2/2.

Provision made to apply to all late applicants; Am. 32 to RO 11; issued and effective 1/26.

Regional Administrators on East Coast given power to issue emergency orders; Am. 33 to RO 11; issued and effective 1/27.

Same values as for third heating period fixed for fourth, except for Kentucky and those parts of Ohio, Indiana, Illinois, Missouri and Kansas in Zone C, where unit is 10 gal., Am. 3 to Supp. 1 to RO 11; issued 1/27, effective 1/28.

Fourth heating period extended, to begin one week earlier and end 17 days later; Am. 34 to RO 11; issued 1/27, effective 1/28.

GASOLINE RATIONING—RO 5C;—Use of motor boats for pleasure trips banned on East Coast; Am. 15 to RO 5C; issued and effective 1/26.

Temporary transport rations to be issued through March 31; Am. 16 to RO 5C; issued and effective 1/26.

Sullivan County, Tenn. excluded from gasoline shortage area; Am. 17 to RO 5C; issued 1/29, effective 2/1.

Value of A, B and C coupons in Sullivan County, Tenn. restored to 4 gal.; AM. 2 to Supp. 1 to RO 5C; issued 1/29, effective 2/1.

Permanent ration banking plan set up; Am. 18 to RO 5C; issued and effective 1/27.

Coupon credit for bulk users established; Am. 19 to RO 5C; issued and effective 1/28.

STORAGE TERMINALS — GMPR — Price adjustment procedure set up for contract carriers and terminal and storage services; Am. 4 to Supp. Reg. 15, GMPR; issued 1/25, effective 1/30.

USED EQUIPMENT— GMPR —Sales of used equipment not acquired for purpose of sale exempt from price control; Am. 42 to GMPR; issued 1/28, effective 2/3.

WPB—War Production Board

FROZEN MATERIALS—P-98-c—Transfers of inventory stock of materials permitted from one branch of company to another; P-98-c as amended Jan. 29.

HEATING TANKS—L-199—Underfired storage water heaters containing tanks of specified metals may be installed if assembled before Dec. 19, 1942; interpretation 1 to L-199; issued 1/26.

PREFERENCE RATINGS—P-98-b—Oil industry given rating of AA-1; P-98-b as amended Jan. 29.

ROTENONE—M-133—Restrictions revised on use for insecticides; M-133 as amended Jan. 23.

RUBBER—Further power granted to Rubber Director over rubber, balata, rubber products, chlorinated and synthetic rubber; M-13, M-15-b, M-15-b-1, M-15-e, M-15-f, M-46; issued and effective 1/22.

STEEL DRUMS — L-197 — Solid and semi-solid greases, and compounded and uncompounded steam cylinder oils may be packed in drums manufactured before Sept. 14 and purchased before Sept. 14 if new or before Nov. 7 if used; all restrictions removed on drums constructed wholly of heavier than 14 gauge steel, and on used drums constructed wholly of lighter than 23 gauge steel with capacity over 30 gal.; L-197 as amended Jan. 29.

TANK CARS—T-1—Shipments restricted in tank cars and tank trucks of materials (mainly chemicals) other than petroleum and products; Transportation Order T-1; issued 1/30, effective 3/1.

P-98-c Amended To Allow Foreign Transfers

NPN News Bureau

WASHINGTON — Intracompany transfers of material held in inventories were approved by WPB in a Jan. 29 amendment of P-98-c.

The amendment, PAW said, extended provisions of the order to foreign petroleum operators. It still permits an operator to sell inventory stocks to a supplier for direct resale to another operator, PAW said, and also lets an oil industry operator sell materials to another operator without WPB priority permission.

OPA Ups Trailer Oil Allowance

NPN News Bureau

WASHINGTON — OPA Jan. 28 doubled the amount of heating oil allowed war workers who live in trailers and heat by oil burning stoves. This is the second time this winter OPA has upped the ration for trailer heating. Action was taken in Amendment 31 to Ration Order 11, effective Feb. 2.

Repair, Maintenance Get 'AA' Rating

NPN News Bureau

WASHINGTON — Petroleum industry has been given "AA" rating for maintenance, repair and operating supplies through an amendment of P-98-b.

The order said Washington approval must be obtained before an "A-1-a" or "AA-2X" rating can be applied to materials costing $500 or more or before an "AA-1" rating can be applied except that the "AA-1" rating can be used with a district office signature in the case of an actual breakdown to obtain delivery of materials costing less than $500.

Countersignatures by district offices are required on orders of $100 or more requiring "A-2" rating, orders of less than $500 but more than $5 requiring "A-1-a" rating, and orders requiring "AA-2X" rating for materials costing less than $500. The countersignature provisions of "A-1-a" and "AA-2X" ratings, the order said, need not be obtained if the purchase is for material costing $50 or less for use in a research laboratory.

OPA Allows 50-Gal. Ration In Fuel Oil Emergencies

NPN News Bureau

WASHINGTON—Emergency rations of fuel oil beginning Feb. 1 have been made available to homeowners by OPA with issuance of Amendment 30 to the fuel oil regulations. However, only one emergency ration up to 50 gal. may be made by a consumer during the heating year which ends Sept. 30, 1943. The consumer is entitled to this emergency ration even though he has no currently valid coupons, OPA said.

The amount of oil purchased by the consumer will be deducted from his next ration in instances where the coupons have not been issued.

According to the procedure, the consumer signs an "emergency receipt". If he is unable to turn over any coupons, he must state why he is without coupons and give the address and number of his ration board. He is required to indicate the emergency purpose for which the fuel oil is required.

OPA Sets Up Credit System On Bulk 'Gas' Coupons

NPN News Bureau

WASHINGTON—A coupon credit system has been set up in OPA's Amendment 19 to Gasoline Ration Regulations for bulk gasoline consumers who have been unable to secure the new bulk coupons from local ration boards.

The system will be in operation by Feb. 5 and the purchaser will sign a receipt giving his name, address, amount of gasoline bought, and a promise to turn over valid coupons to the sellers within 20 days.

PAW Interprets Credit Ban

NPN News Bureau

WASHINGTON — Payroll deduction for employe purchases of petroleum products at retail outlets constitutes granting of credit and as such is banned by PAW Directive 62, as amended, which prohibits extension of credit, according to informal rulings by PAW.

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and publisher, Penton Building, Cleveland, O.

War's Demands for Oil Jump— Our Oil Supply Drops— But OPA Holds Its Price Ceiling Sacred

JUST as war greatly increased demands for petroleum products, OPA refused to allow a rise in the price of crude oil that would increase a failing supply.

Last fall, retiring Chairman Cole of the House Special Oil Investigating Committee, made report to his chief and friend, President Roosevelt, who had just promoted him to an important judgship, warning that if the administration's policy toward oil was continued this country would have a serious shortage of oil for military purposes by the fall of 1944, let alone for civilian purposes. Chairman Cole was criticizing the administration's policy of low price ceilings and refusal of production materials with which to find and produce more crude.

OPA, in its report this week, bases its findings on a determination from the Tariff Commission's cost report on oil production, and says that the "majority" of producers are not losing money, that stripper wells are not operating at a loss, that a price increase of 1c per bbl. would cost the country $14,000,000 per year, and that exploration cost cannot be solved "properly" by a general price increase.

So oil production continues to decline, we continue to produce more oil than we find, our planes, tanks, jeeps, ships and war plants continue to use an increasing quantity of petroleum products, and oil, in decreasing supply, becomes a greater and greater essential to our war success. But the sacred OPA price ceilings must not be pierced—not even to win the war.

Which First— Money for the Unioneers?

LAST week the following testimony was given from the oil industry as to the need for higher petroleum prices:

Chairman Donnell reported that his Production Committee for District 2 had studied a progress report from a subcommittee which will show need for higher crude oil prices.

Secretary Day of the Western Petroleum Refiners Assn. testified before U. S. Senate committee investigating oil rationing at Oklahoma City that higher tank car prices are needed at once or else refiners will have to shut down, that they cannot carry on at a loss much longer.

The subcommittee of the Supply and Distribution Committee of District 2, in a report for the P.I.W.C., said that higher prices are needed to compensate refiners for reducing their gasoline yields to make more fuel oil, this at the request of the government.

Secretary Primm of the Illinois Petroleum Marketers Assn. forwarded to OPA replies of Illinois jobbers to OPA questions as to why they need a 0.5c increase in their present 2c margin. Primm said the replies showed the increase was required by increased freight rates and general wage and other war expense increases in marketing.

Last week, also, John Lewis of the United Mine Workers, C.I.O.'s Murray and the various railroad brotherhoods made demands for wage increases because of the increase in the "cost of living". At the same time the Treasury Department and other officials were proclaiming their alleged search for some means of reducing the "excess in buying power", said excess being due to the various increases in wages allowed by another arm of that administration, which other arm is now faced with still more strikes.

Which comes first?

More money for the professional unioneers and their associates who now have that "excess buying power" that the Washington economists say threatens us with "inflation"? Or

Oil for the Army and Navy, and the boys who are driving the tanks and jeeps and sailing the seas and flying the planes?

Before Roosevelt proclaims "unconditional surrender" before the fact, maybe he had better provide some oil with which to win such a surrender?

Oil Must Tell Its Price Story

AS THE country needs oil to carry on the war and needs it also for its civilian life, and as the oil industry must have higher prices to find, produce, refine and distribute that oil, it becomes the oil industry's DUTY to present the facts to the citizens of America before a catastrophe occurs. It should be the citizens' prerogative to say whether they will walk further than they do now, live in colder homes and offices than now, or that their sons will refrain from battle because they do not have enough lubes and motor fuel to fight.

Oil companies can tell the story in detail of just what oil means in this war, what part it plays on the field of battle, on and under the seas and in the air. The story can be straightforwardly told, just with facts. No dramatics will be needed. But it can be so well and frequently told that every time the average citizen sees a tank, a jeep, truck, ship or plane, or the pictures of them, he will also think of the part that petroleum plays in that engine of war.

Oil companies can also tell the story of what petroleum means in the manufacture of these engines of war—just plain, factual stories of petroleum in the factories, in the mines, and in transportation of materials. Some companies are now doing this but more of the story can be told and by more companies.

This story can be prepared by each oil company in its own style and told in its own terms. It is not necessary to organize a campaign or get the companies to agree upon a plan. Rather, each can work up its own ideas today or tomorrow, as it wishes. Each can publish that information in a variety of ways, and the refining companies can hand on the material for their jobbers and dealers to pass out and to talk about.

Each company, large and small, has a part in oil's contribution to the war and each can tell of that part in plain language. The effort need not be expensive; in fact, the simpler the better. The public wants facts, which it has been getting little of from those who have to do with conduct of various war activities, such as, particularly, seeing that the oil industry is strong enough to bring forth the increasingly great supply of petroleum required for the war against totalitarianism . . . in other lands.

(Another Editorial on Next Page)

Consulting Jobbers Ahead of Writing Reports On Joint Use of Facilities, Promises New Era Of Better Oil Industry Cooperation

TWO of the industry's preliminary studies of oil marketing facilities from which plans are to be made, if possible, for joint use of such facilities in case the war necessitates, will be presented to meetings of oil jobbers for open and full discussion in the next two weeks.

These jobbers are the ones that some, at least, of the experts at Washington have expected to sweep out of existence as "socially undesirable" and unnecessary to an efficient marketing of petroleum.

The basic facts developed by two of these studies, the facts that will not disclose the identity of any contributing oil company, will be presented and discussed at a specially called meeting of oil jobbers held under the auspices of the Ohio Petroleum Marketers Assn. at Columbus on Feb. 11 and at the annual meeting of the Illinois Petroleum Marketers Assn. at Peoria, Ill., on Feb. 18.

At these meetings the facts will be explained. What they mean, or if they mean anything, will be open for discussion of all present.

The Columbus meeting is primarily a meeting of the Ohio sub-committee of the Committee on Joint Use of Facilities of the Marketing Committee of District 2. President Weber of O.P.M.A., as a member of that subcommittee, will preside. To reach representative jobbers quickly, President Weber issued an invitation to attend as observers to the 60 members of the O.P.M.A. advisory committee and has asked them to see that the invitation was extended to other jobbers in their territories.

The meeting will begin at 10 a.m. in Parlors H I and J of the Deshler-Wallick Hotel. Owing to the hotel being filled with other conventions, these parlors, seating about 150, are the largest space that could be obtained.

Two areas in Ohio have been surveyed for the study. Facts were obtained from the oil companies operating in these areas as to where supplies come from, how they are brought in, the types and capacities of marketing facilities used, and, so far as possible, all facts that might show what the marketing situation is today. These facts are now being added up so that totals can be presented at this meeting. The field work is being done by men from many oil companies under the supervision of two marketing surveying experts from two of the interested companies. It is hoped that what these two areas may show can be interpreted as representing the rest of Ohio.

At Peoria, the discussion on the marketing survey will begin at 2:15 p.m. Feb. 18. It will be opened by H. T. Ashton, chairman of the subcommittee of the District 2 Marketing Committee carrying on the general survey. All told some 19 areas in District 2 have been surveyed and now the facts are being compiled for study. Secretary Primm hopes to have Deputy Petroleum Administrator Davies on the program following Chairman Ashton as a further aid in the discussion of the better use of marketing facilities during the war period.

Men Appreciate Frankness

The value of thus frankly presenting the facts of these surveys to the marketers before final reports are drawn should be considerable. Everyone knows that there are bound to be business fatalities in oil as a result of the war. The one big fear of most men, a fear fairly credited to the socialistic efforts of the New Deal, is that some may be fatalities not as a result of war but as a result of the infliction of socialistic ideas.

The studies on joint use of marketing facilities now in progress have been started, planned and carried on by oil men, through committees named by PAW and representing quite fairly all classes of oil marketing. Facts presented at these meetings will be oil company facts, set up by oil men. We are assured that all oil men will be given every chance, short of divulging trade identities in those facts, of studying and discussing their possible meaning and application to the problems of war.

It is truly a cooperative effort, as planned, to get the general understanding of the industry of the problem to the end that the solution may be generally accepted and used, if the war requires it.

It is to be hoped that after all the facts are in and studied that the surveying committees will develop as many tentative plans of operation as may seem practicable and present all of them, with the supporting facts, to the entire oil industry. That is the procedure of the country's best scientific societies which assume the obligation of writing standards of tests and methods for industry. For a quarter of a century and more it has been found by these societies that this divulgence of ideas and facts to a whole industry has worked to a weeding out of "bugs" and has made the plans fair to all. When the final plans were presented they went into operation by all without criticism or resistance.

What this country needs today is that same degree of general cooperation, of acceptance by all and then a full and hearty participation by all in the plans of war. But such much-needed, whole-hearted—yes, even spiritual energizing—of the American people and oil people can only come from all being given full participation in the planning, studying and making of the industry's and country's plans.

These two meetings in the next two weeks, if all the jobbers of those states will come and participate in them, and if the planning committees will likewise consult all other jobber organizations, should presage a new era in oil industry war cooperation.

And we hope that Deputy Petroleum Administrator Davies can attend the Peoria meeting for, just as when his chief attended the Wisconsin jobber meeting last month, it will bring a closer thinking and doing between those who seem far away at Washington and the "average oil man", major and Independent, manager and employe, out "in the territory".

Gallagher Named Director Of PAW's District 5

NPN News Bureau

WASHINGTON — Herbert R. Gallagher, whose last oil connection before retirement in 1940 was that of president of Consolidated Oil Corp., (Sinclair) New York, has been appointed PAW's District 5 director in charge. Official announcement of the appointment was made by PAW Deputy Davies on Jan. 29. Under NRA, Mr. Gallagher was chairman of the general committee of Region One. During World War 1, he was a member of the Petroleum War Service Board. Mr. Gallagher left immediately for the West Coast to assume his duties.

Commenting, Mr. Davis said:

"The appointment of Mr. Gallagher as director-in-charge establishes a new general position, better providing for the needed coordination of the various functional divisions and for a senior member who will have over-all responsibility for the conduct of the affairs of the petroleum administration in the western district."

* * *

LOS ANGELES—Herbert R. Gallagher, former president of Consolidated Oil Corp., has accepted position as PAW District 5 director in charge.

Color Helps Spot Black Market In Fuel Oil Ration Coupons

NPN News Bureau

WASHINGTON—As a possible guide for oil men in spotting any fuel oil coupons that might circulate in the black market, NPN presents the following table showing the different colors used for Class 1 and Class 2 fuel oil rationing coupons:

Zone	Color
A	Red
B	Green
C	Blue
D	Purple

Class 3 coupons are all brown, OPA spokesman said, recalling that Class 3, 4, 5 and 6 coupons had been consolidated into Class 3 coupons.

For a map of the zones, see NPN, Sept. 30, 1942, p. 9.

With the ASSOCIATIONS

Wisconsin Jobbers Urge Larger Margins, Share in U. S. Sales

Special to NPN

MINNEAPOLIS—Increase in tank wagon and service station prices on gasoline and fuel oil and a share for the jobber in the supplying petroleum products to war agencies, were called for in resolutions passed at the 20th annual convention and war conference of the Northwest Petroleum Assn., held at the Radisson Hotel here Jan. 28-29.

The convention closed with nearly 600 in attendance, according to Elwin E. Hadlick, association president and secretary. Mr. Hadlick and C. W. Johnson, treasurer, were re-elected to office for another term. Only change in the board of directors was the addition of Edward H. Ness, Thief River Falls, Minn., Oen Mercantile Co.

Would Decentralize Authority

Convention resolutions urged that state offices of OPA be given more authority and that rationing be simplified. Local offices are in better position to know local conditions and to adjust schedules and regulations so as to make them properly applicable, the oil men said, in soliciting the attention of Prentis O. Brown, new OPA administrator, and public authorities to preserve small business.

High spot in the convention was the open forum discussion of new service station closing hour regulations, proposed zoning of supply and distribution areas, and joint use of marketing facilities.

Convention Speakers

E. B. Haedecke, director of petroleum division, Minnesota Department of Taxation, St. Paul, addressed the convention on "War Petroleum Program," and Dr. O. B. Jesness, chief division of agricultural economics, University farm, discussed "Farmers as Consumers of Petroleum Products," pointing out that while farmers are now big users of oil in many forms, they would be even bigger and better customers of the industry after the war.

Open forum on rationing and price regulations was conducted by state OPA representatives from St. Paul. Edward Jennings, price attorney for OPA, talked on prices, A. C. Sundy on gasoline rationing, and Carl W. Dokmo and N. S. Sthelpf on tire rationing and inspection.

South Carolina Jobbers Protest PAW Allocations

COLUMBIA, S. C.—W. L. Heinz, president of the South Carolina Oil Jobbers Assn., protests inequalities of PAO No. 1 and the allocation of petroleum products to independent oil jobbers in South Carolina in 2 letters to PAW's District 1 marketing director. Full text of both letters follows:

Columbia, S. C.

Director of Marketing for District 1,
Petroleum Administration for War,
122 East 42nd St., New York.

Dear Sir:

During the past several years the oil jobbers of South Carolina have purchased a considerable quantity of petroleum products from independent refineries located in Mississippi, Louisiana, and Texas. In the allocations allowed in PAO No. 1 no consideration is given to this gallonage. In the case of jobbers buying their total requirements of kerosene and tractor fuel from this source they are left without any source of supply.

The reason many jobbers purchased from the independent refineries was because their former major supplier requested that outside products be bought as the majors could not furnish all the jobbers' requirements. Under the present allocation the jobbers' available quantity is based on only what he purchased from his major supplier. The ignoring of this large percentage of the Jobbers' supply has resulted in an unequal cut in his allowable.

Directive No. 59 prevents shipments of any tank cars to jobbers, and therefore no portion of this former source of supply is available to him.

At the present time spring plowing and planting is now taking place in this territory while the problem of heating homes has not ended. The month of February has always been the peak month for kerosene sales in this territory, and this sudden curtailment of supplies has resulted in preventing the jobber who supplies most of the farm business from furnishing the farmer with enough fuel to produce anywhere near the "Food for Freedom" that he could otherwise produce. This is a serious situation and should be rectified immediately.

It is our understanding that it will be some time before the trainload supply terminals will be in operation, and we earnestly urge that single tank cars of kerosene and tractor fuel be permitted to be shipped and that the independent refineries be given an allocation in proportion to their former sales in this territory.

We feel sure that this discriminatory effect of PAO No. 1 was unintentional, and that you will correct this important defect which is hindering the war effort in our territory.

Very truly yours,
W. L. Heinz, President,
South Carolina Oil Jobbers Assn.

o o o

Columbia, S. C.

Director of Marketing for District One,
Petroleum Administration for War,
122 East 42nd St., New York.

Gentlemen:

The allocation of available quantities of petroleum products according to 1941 sales is most unfair to the independent jobbers. The percentage of loss of many of the major companies has been considerably more than the average while the jobbers' loss has been much smaller and in some cases has been a gain in 1942 over 1941.

This conclusion is proven as follows:

1. In 1941 major companies supplied state highway and private contractors building and maintaining roads, bridges and highways. Most of such work has been held up for the duration.

2. Discontinuance of policy allowing commercial accounts a price of one half cent over Tank Car for T. W. deliveries. The jobbers were unable to compete at this price, but at regular T. W. price are able to hold business.

3. Percentage of closed stations greater with majors than with jobbers.

4. Loss of business of the market leader in this territory is 28.2% while average loss is 16.8%.

5. Jobbers located in defense areas have had a tremendous increase while jobbers in agricultural areas have to supply more farms increasing their production of "Food for Freedom".

We appeal to your committee to revise allocations on a more equitable basis consistent with the present percentage of service rendered, and the business now handled.

Very truly yours,
W. L. Heinz, President,
South Carolina Oil Jobbers Assn.

Joint Use of Facilities Plan Is Topic at I.P.M.A. Meet

Special to NPN

SPRINGFIELD, Ill.—H. T. Ashton, chairman of the joint use of marketing facilities subcommittee, District 2, has accepted an invitation to discuss progress of that program at Illinois Petroleum Marketers Assn. convention at Peoria Feb. 18, G. A. Primm, association secretary, has announced.

R. K. Davies, deputy administrator of PAW, has been invited to speak, Mr. Primm said.

Other speakers from Washington will include Samuel F. Niness, petroleum motor transport section, ODT, and Robert Collacott, head of OPA's refined products price section.

Theodore MacKay and John Matthews, also of OPA, will discuss gasoline and fuel oil rationing. Carter Jenkins, state director of OPA in Illinois, will talk on OPA orders and regulations within Illinois.

Wisconsin Petroleum Association Takes Full Charge of Its Paper

NPN News Bureau

CLEVELAND — The *Wisconsin Petroleum News*, official publication of the Wisconsin Petroleum Assn., is now being published and edited directly by the association. For the past 20 years it was published by an outside source.

Wilson L. Delzell, W.P.A. president, is editor. Roy L. Brecke, the association's executive secretary, is managing editor, and Myrta Meyers is advertising manager.

The first issue under the new arrangement was the Christmas number. It was attractively printed in green on glossy stock and contained 16 pages of timely material of interest to oil men.

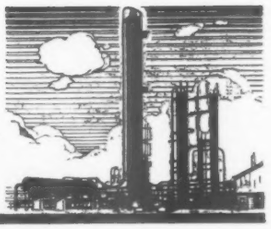
K.P.M.A. Changes Address

LOUISVILLE — New address of the Kentucky Petroleum Marketers Assn. is 433 Martin Brown Bldg., Louisville, Ky.

California 'Gas' Sales Drop 40%

NPN News Bureau

LOS ANGELES—Gasoline tax income in California for month of December dropped 40.01% below the same month of 1941, the state reports. Taxable gasoline sales for December, 1942, amounted to 108,573,680 gal. as compared with 180,988,610 gal. in December, 1941.



Byrnes' New Directive Promises Balance In Rubber Program

NPN News Bureau

WASHINGTON—Everybody talks about the White House directive which "decided" the 100-octane vs. synthetic rubber controversy, temporarily, but no one seems to know exactly what it is all about.

Here's the best information NPN can obtain:

On Dec. 8, WPB issued an "emergency rating" list of 100-octane and synthetic rubber projects which could be completed by Mar. 31. Those projects were numbered 1 to 56, but because No. 17 was followed by 17A to 17GG, there were really 90 projects on the list. Each project listed was entitled to priority over any other project not on the list or which had a higher number on the list. This "freeze" enabled these plants to get materials to meet their scheduled completion dates.

The list included a number of butadiene, styrene and copolymerization plants. But when completed, these scheduled plants will throw the rubber program off balance because there will be, for example, more copolymer capacity than there is butadiene supply available.

That brings us down to the new "directive" which has been promulgated by Economic Stabilizer Byrnes at the Whitehouse.

New List Includes Rubber Plants

In this new list of some 20 projects (which can be completed in April, May, or June) entitled to "emergency rating" there are enough synthetic rubber projects to balance off Rubber Director Jeffers' program so that styrene, butadiene, copolymer and other components of the rubber program are in balance for maximum production.

The new list also includes several "urgently needed" 100-octane plants which can be completed by end of June.

Giving "emergency ratings" to these projects, however, does not mean that work will not go ahead on the several hundred other 100-octane and synthetic rubber projects.

Officials connected with the programs emphasize that it is not possible to state the effect of this "directive" in terms of percentages of the whole rubber program because of varying factors.

Sohio Builds Cracking Unit

NPN News Bureau

CLEVELAND—A $7,000,000 cracking unit to make base stocks for aviation gasoline is under construction for Standard Oil Co. of Ohio. The unit is being financed by Sohio, but Defense Supplies Corp. will take the output. E. B. Badger & Sons Co. is contractor. Location of the plant and other details are being withheld in compliance with censorship regulations.

Rubber Delay Broils Jeffers

Rubber Czar Strikes Out at Nelson and at Army-Navy 'Expediters'; Tells of Synthetic Plants and Conservation Projects To Be Dropped

NPN News Bureau

WASHINGTON—The military vs. Rubber Director Jeffers fight over components for their programs—escort vessels, 100-octane gasoline and synthetic rubber—flared up with few punches pulled at a full-dress session of the House military and naval affairs committees Feb. 1.

Mr. Jeffers appeared for himself. For the military were War Undersecretary Patterson, Navy Undersecretary Forrestal and much Navy "gold braid" including two admirals.

End of the day found Mr. Jeffers still bent on pushing his synthetic rubber "in spite of hell and high water", according to his own statement. The military was grimly watching him and promising a "vigorous protest" if the escort vessel and 100-octane programs are interfered with.

Originally scheduled as an opportunity for Mr. Jeffers to support with facts his Baltimore statement that military "expediters" in plants are bogging down war production, the hearing soon tangled with the bigger issues involved—the battle of priorities.

Army Has 15,000 "Expediters"

Mr. Jeffers, first of the trio called to the witness table, not only reiterated but enlarged on his Baltimore charges. The military, he said, had some 15,000 "expediters" in plants throughout the country and is looking for more. He read from a Boston newspaper that the Navy was looking for 40 more expediters there to be assigned to breaking "bottlenecks" to keep production up to schedule.

"I know inspectors are necessary," Mr. Jeffers declared, "to see that the Navy gets the right quality products. What I object to are expediters to take over and tell management how to run their business."

Mr. Jeffers charged the Army and Navy with wanting to "take the country off rubber", reading excerpts from letters from Army and Navy officials (*see story on p.* 3).

Asked as to the status of synthetic rubber plants under construction, Mr. Jeffers replied that because of changes in directives and priorities he was "not sure from day to day where we stand on construction".

"Can't Get a Decision from Nelson"

The "worst situation", he told the committee, with regard to the rubber program is inability to get decisions as to what comes first—escort vessels, 100-octane or synthetic rubber.

Mr. Jeffers laid the blame for this on WPB Chairman Nelson and expressed impatience that he has not been able to get a prompt decision and one that would stick.

When a decision is made, he said, it should be prompt, clearcut and carried through—not changed from day to day. He said he had no quarrel with Mr. Nelson and believed the WPB chief was doing the best he could. He declared that "Nelson is somewhat reluctant to make a decision that does not meet the views of the Army and Navy."

Jeffers to Cancel Big Project

He told the committee that the contract for "one big" rubber plant is to be cancelled "because it is coming in too late." And some refinery conversions are to be dropped. He gave no hint as to what project he had in mind.

Mr. Jeffers professed "some doubts" as to what Chairman Nelson's directive—in the 100-octane vs. synthetic rubber controversy—means, but hoped it would be cleared up soon at a conference.

Col. Bradley Dewey, assistant rubber administrator, remarked that the effect of the directive was "if we had some ham we could have ham and eggs if we get some eggs."

Patterson Denies Jeffers' Charges

War Undersecretary Patterson declared at the outset of his testimony that there was "no basis whatever" for Mr. Jeffers' charge that "expediters" were interfering with war production. He said the charge was based "not on facts but irritation he (Mr. Jeffers) has felt over not only rubber but other programs."

Mr. Patterson complained that Mr. Jeffers wanted "topriding" priorities over everything else, even over AAA ratings that are reserved by the military for the most essential items. He said Mr. Jeffers now is receiving 16% of the AAA ratings.

He said the Army has no expediters except on one of its programs—electronics, although it has "plenty of inspectors for quality".

Quizzed on "Battle of Stars and Bars"

Chairman Thomason asked him about the reported "battle of the stars and bars" in the plant production lines. Mr. Patterson said he had no comment. Asked if he had received any complaints from plant managers about interference from Army representatives, he said none had come to his notice.

Mr. Jeffers, he said, has his full share of critical materials, and commented that "a great

WPB Chief Donald Nelson (at right of camera) appeared before the Gillette committee of the Senate shortly after Rubber Director Jeffers touched off the fuse on the Jeffers-military explosion over delays in synthetic rubber production. Nelson said responsibility for rubber plant priorities on Jeffers' shoulders, saying that on rubber matters "we must rely on the rubber director". Later Nelson admitted that since Jeffers is a part of WPB, he, Nelson, was responsible for deciding between rubber and other war production programs

deal more could be done yet in conserving rubber".

Mr. Patterson said he had no objection to building up a synthetic rubber industry in this country, in spite of the fear expressed by Vice-President Wallace that such an industry would cut off foreign trade after the war. In reply to questions, the Undersecretary of War said no pressure had been brought to bear on him to discourage a synthetic rubber industry.

Mr. Patterson said the Army was in "thorough accord with the Navy's putting escort vessels first" among the "must" programs. The Navy is far behind, he said, in the escort program. There is no competition between the Army and Navy over priorities for their programs, he said, as they are able to get together and work out their differences through the War Munitions Board.

Appeal to Byrnes

Under close questioning, Mr. Patterson admitted that "one" priorities case had been appealed to the President from WPB Chairman Nelson. This was referred to Economic Stabilizer Byrnes, he said, but was not sure any decision was ever made. Questioned more closely; he admitted the case involved synthetic rubber, and he believed Mr. Nelson was going to give rubber the highest priority. It wasn't a decision, he said, just a ruling.

"Did you get what you wanted?" he was asked.

"Not altogether," the undersecretary replied.

"Jeffers didn't get what he wanted?"

Mr. Patterson replied positively, "he did not".

Navy Undersecretary Forrestal, interrogated about the case, expressed the opinion that Mr. Nelson was under great pressure from all concerned and was right in taking the case to Mr. Byrnes.

Mr. Forrestal said the Navy was willing to go along with the "ruling" although it would interfere with the escort vessel and 100-octane program. He said they were going to watch closely, however, to see that the "spirit" of the ruling was observed but would "violently protest" attempts to use high priorities to compete with Navy "musts".

He thought the spirit of the ruling could be carried out if the rubber requirements were "carefully scheduled". He hoped that the rubber director would not go to certain big plants engaged in making components for the Navy programs to get his materials. He felt sure Mr. Jeffers could find many small machine shops throughout the country that would turn out the parts he requires for synthetic rubber.

Asks Probe of Rubber, 100-Octane

NPN News Bureau

WASHINGTON—Rep. Rowe, Ohio, introduced a joint resolution Jan. 27 to create a commission to determine the relative importance of rubber, escort vessels and aviation gasoline to the prosecution of the war. The commission would be composed of 3 members appointed by the President and would report to Congress results of its investigation. The resolution was referred to the military affairs committee.

First Butadiene Plant In U. S. Program Now in Production

NPN News Bureau

NEW YORK — Standard Oil Co. of Louisiana now has in operation the first of the butadiene plants which are to produce raw material from petroleum for the government's synthetic rubber program, the Standard Oil Co. (N. J.) announced here Jan. 29.

Louisiana Standard's plant, the Jersey company said, has a rated capacity of 6600 to 9000 tons of butadiene per year—enough to produce rubber for 1,300,000 to 2,000,000 tires per year—depending on the quality of the fractions used as feed stock.

Construction work was finished by the contractor "three weeks ago", the announcement said, and since then Louisiana Standard has been putting the finishing touches on the plant, testing various sections, and bringing them successfully into operation.

"The entire plant is now in full operation, and the finished butadiene is being delivered," the Jersey company's announcement stated.

Started Before Pearl Harbor

Louisiana Standard began construction of the plant prior to Pearl Harbor. While planned and privately financed by Louisiana Standard as a means of increasing its own production of special types of synthetic rubber for which there was a commercial demand before the war, the Rubber Reserve Co. has since contracted for the entire output in order to speed

the government's synthetic rubber program, the Jersey company announcement said.

The company said the butadiene produced by the plant is 99% pure, "thus exceeding the strict government purity specifications."

The plant was originally scheduled for completion Oct. 1, 1942, and the delay has been due to increasing shortages of critical construction materials since the outbreak of war.

Three additional butadiene plants are well along toward completion in the same area. They are either wholly or partly financed by the government "and will be coming into production successively during the next 3 months," it was announced.

Phillips Completes Alkylation Plant

NPN News Bureau

TULSA — The first large commercial plant utilizing the basic principle of paraffin-olefin alkylation using hydrofluoric acid as the catalyst has been completed and now is on stream. Phillips Petroleum Co. officials made the announcement Jan. 29. The plant, size and location undisclosed, went into operation the latter part of 1942.

The process was developed by Phillips' Research department several years ago, the announcement continued, and the plant was designed and built by company's engineers. Invitations to inspect the plant and receive additional information on the process have been issued to a group of technical representatives from the petroleum industry, the government, and to engineering concerns and oil companies participating in the aviation gasoline program, officials said.

Announcement disclosed but few details concerning the process. However, it was learned the process operates at temperatures permitting use of ordinary cooling water, eliminating necessity for extensive mechanical refrigeration required by certain other alkylation processes.

Acid consumption is said to be "insignificant", resulting in low acid replacement costs and no acid sludge disposal problem. Design of the plant is such that appreciable savings in the use of critical materials may be effected, and certain design features of the new plant have been incorporated in hydrofluoric acid catalyst plants now being erected by others, company officials said.

(For further details on use of hydrofluoric acid as an alkylation catalyst, see NPN April 29, 1942, p. R-131 and Oct. 28, 1942, p. R-366 —Ed.)

RFC Increases Root Contract

NPN News Bureau

WASHINGTON—RFC announced on Jan. 28 an increase in its contract with Root Petroleum Co., Shreveport, La., to provide additional plant facilities in Arkansas at a cost of approximately $980,000, resulting in an over-all commitment of about $4,480,000. Root Petroleum Co., RFC said, will operate the facilities, title remaining in Defense Plants Corp., RFC subsidiary.

Technical Union Urges Large Increases In Conversion Jobs

Special to NPN

OAKLAND, Calif.—We cannot afford to wait for completion of new butadiene plants but must act without delay to convert existing refining facilities to produce "quickie" butadiene, the Federation of Architects, Engineers, Chemists and Technicians, C.I.O., believes.

This, said the union in a statement Jan. 28, "is the essence of a report submitted today by Marcel Scherer, international vice-president of the FAECT, to Rubber Administrator William M. Jeffers."

The union said it is necessary for Mr. Jeffers to reconsider the recommendation of the technicians and specialists who prepared the Baruch report.

"In view of the present critical situation, the present quota (of conversion projects) must be scaled upwards by a considerable amount," the statement said.

Views on Manpower

Quoting Mr. Jeffers as saying that the latest bottleneck in the rubber program is the shortage of technical manpower to operate the plants, the union said it estimated a minimum of 10,000 chemists, engineers, technicians and plant operators will be required. It called for the immediate launching of "a positive coordinated plan on a regional and national scale for training technical manpower", asserting this could be accomplished by establishing a "Rubber Industry Council with representatives of the trade unions involved in the rubber program, the oil workers, the rubber workers, the FAECT, and the companies, large and small."

The union said there are 2000 highly-trained technicians in key petroleum laboratories in California. It proposed that 500 of these be trained as "technical commandos" to prepare themselves now to man the new butadiene and rubber plants and to carry out on-the-job training within the plants. It also proposed that the University of California give special courses in rubber technology, particularly for those with training in petroleum technology.

"Too much emphasis cannot be placed on the need for giving American labor representation in the carrying through of this vital plan for conservation and for training manpower," the union declared. "Up to this time, the representatives of the largest petroleum companies have been given responsible assignments and their failures are evident. The answer lies in a Synthetic Rubber Industry Council—the direct application of the C.I.O.-Murray Plan to this problem."

Favors Alky-Rubber Process

NPN News Bureau

WASHINGTON — Conversion of grain alcohol to butadiene is best synthetic rubber process for immediate use—better even than the butylene glycol method which skips the alcohol step, according to Dr. Alex C. Burr, North Dakota Industrial Commission, testifying Feb. 1 before Sen. Gillette's committee.

Dr. Burr said new developments in fermentation involving production of butylene glycol instead of ethyl alcohol are "most promising" but are not yet advanced beyond the pilot plant stage. Many wrinkles still remain to be ironed out, he added.

He urged not only location of alcohol-butadiene plants in the grain belt but co-polymer plants as well to save transportation. Dr. Burr revealed North Dakota has asked WPB to locate an alcohol-butadiene plant in that state.

A.C.S. Program Ready For 105th Meeting

NPN News Bureau

CLEVELAND — Developments in petroleum chemistry which are aiding to the nation's war effort will be emphasized at the 105th national meeting of the American Chemical Society in Detroit.

The meeting, to be held April 12-16, schedules 10 "war symposia". Oil company technologists will be most interested in those on recent developments in synthetic rubber technology, and on solvents, in addition to the sessions of the society's petroleum division.

Society President Per K. Frolich, director of the Esso Laboratories—chemical division of Standard Oil Development Co.—will preside at the general session April 14. Among those attending will be Dr. Thomas Midgley, Worthington, Ohio, vice-president of Ethyl Corp., who is president-elect of the society.

Honorary vice-chairman of the Detroit meeting is Dr. George Calingaert, director of chemical research for Ethyl.

Dr. C. L. Brown, director of research and development for Standard Oil Co. of Louisiana, is chairman of the petroleum division of the A.C.S.; Dr. R. E. Burk, director of research for Standard Oil Co. of Ohio, is vice-chairman; and Dr. L. M. Henderson, supervisor of research for Pure Oil Co., is secretary.

Proposes Texas Tax 'Gas' At the Refinery

Special to NPN

AUSTIN — Thanks to a general feeling of "no new taxes" in the Texas Legislature, the Texas oil industry is not overly worried about a drastic tax bill introduced by Representative Davis of Waco.

The Davis bill would levy a tax of 1.5c per gal. on all gasoline leaving the refinery, and estimates figure the bill would raise between $75,000,000 and $80,000,000 a year. It would repeal the present 4c per gal. retail tax on gasoline.

The Davis measure has been sent to the committee on revenue and taxation, but no date of hearing has been set. An almost identical bill was defeated in the last session of the Legislature.

Object of the Davis bill is to put the tax burden on out-of-state consumers, since only approximately 15% of the gasoline refined in the state is consumed here.

Autocar Half-Tracks

TEAM FIRE-POWER WITH HORSE-POWER

ARMY E NAVY

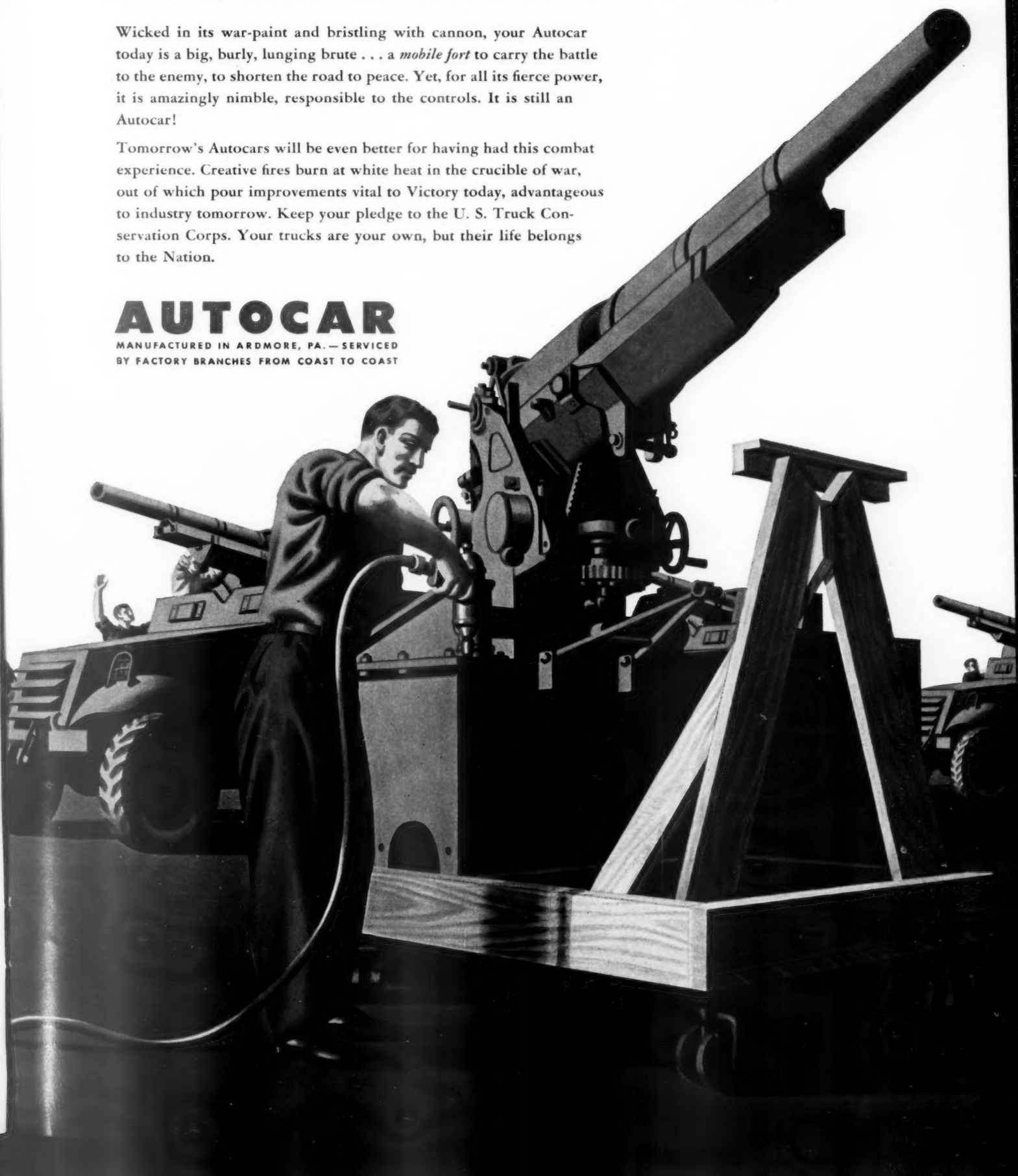
AWARDED AUGUST 1, 1942...
"FOR EXCELLENCE
OF PRODUCTION"

Wicked in its war-paint and bristling with cannon, your Autocar today is a big, burly, lunging brute . . . a *mobile fort* to carry the battle to the enemy, to shorten the road to peace. Yet, for all its fierce power, it is amazingly nimble, responsible to the controls. It is still an Autocar!

Tomorrow's Autocars will be even better for having had this combat experience. Creative fires burn at white heat in the crucible of war, out of which pour improvements vital to Victory today, advantageous to industry tomorrow. Keep your pledge to the U. S. Truck Conservation Corps. Your trucks are your own, but their life belongs to the Nation.

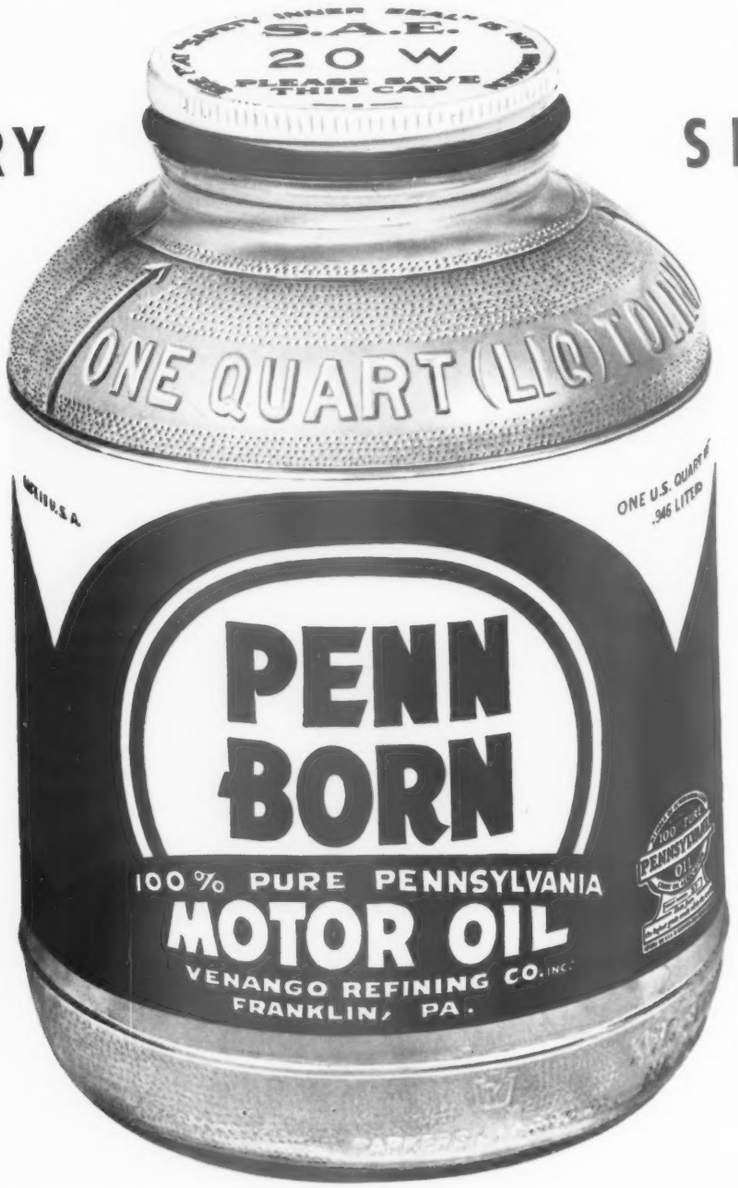
AUTOCAR

MANUFACTURED IN ARDMORE, PA.—SERVICED
BY FACTORY BRANCHES FROM COAST TO COAST



100% PENNSYLVANIA

REFINERY **SEALED**



MEMBER OF PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION . . . PERMIT NO. 57

Available in One-Quart Glass Jars, packed 12 to a case; or in returnable 54-Gallon Drums. Franchise arrangements still open in some territories. Write for details.

VENANGO REFINING COMPANY, INC.

Midwest and Southern Office:
400 West Madison Street, Chicago, Ill.

REFINERIES:
FRANKLIN, PA.

Pacific Coast Office:
617 West 7th Street, Los Angeles, Calif.

PRODUCTION NEWS

Crude Ceiling

OPA Clarifies Formula for Ceilings On Crude Oil; Seeks Greater Uniformity in Establishing Maximum Prices

NPN News Bureau

WASHINGTON — "Clarification" of its formula for crude oil ceilings has been made by OPA with issuance of Amendment 63 to Price Schedule 88, "to achieve greater uniformity in establishing maximum crude petroleum prices at October, 1941, levels."

The action was explained by OPA as follows:

"1. Maximum prices for crude petroleum are intended to reflect actual market conditions within a given oil pool, or at such other points where the oil was sold, during the base price period of October, 1941. Some sales of that period were made under long-term contracts which did not necessarily reflect current market prices.

"2. Price paid at the receiving tank or at some other point under a contract which was in effect prior to the base price period shall not be considered in determining ceilings under price control unless the contract price actually reflected October, 1941, marketing conditions for the particular pool involved.

"In general, Revised Price Schedule No. 88 . . . provides crude oil ceiling shall be those posted for an oil pool during the base period, or the price paid at the receiving tank during that period. OPA's amendment to that schedule . . . seeks to eliminate inequities arising from factors which may have controlled sales at a point below the current October, 1941, market.

"The amendment further provides that the maximum price of crude oil purchased at a point other than the receiving tanks shall be at no greater differential than prevailed at the same point in October, 1941. Such a differential shall not be considered, however, if it fails to reflect the current market conditions of that month.

"The amendment authorizes the buyer and seller to establish a temporary differential for a sale at a point other than the receiving tank, subject to disapproval by OPA, when a maximum price cannot be otherwise determined under the provisions of the schedule."

The amendment, OPA said, is effective Feb. 3, with its principal effect being felt in small pools whose production was sold under long-term contracts which did not take into consideration progressive increases in market prices, cost of production or changing market conditions.

Swapping Pipe

PAW Says Redistribution Plan for Tubular Goods Is Working Smoothly. May Broaden Plan To Cover Industry

NPN News Bureau

WASHINGTON — Encouraged by successful use of redistribution plan for tubular goods in production branch, PAW is considering broadening the plan to cover additional materils and perhaps applying it to the entire oil industry.

Although complete data on the footage of tubular goods transferred among oil operators has not been compiled here, reliable sources estimate that between 750,000 and 1,000,000 ft. have changed hands.

Biggest transfers in point of footage have occurred in District 3 where it is estimated operators have exchanged about 450,000 ft. of pipe which was found to be surplus.

Plan started functioning in December, with producers reporting to PAW the amount of tubular goods on hand Sept. 30. Footage used in third-quarter of 1942 was subtracfed from the inventory and the resulting figure was used as the operator's surplus or deficit of materials.

PAW Puts 'Teeth' in Plan

PAW actually made the plan mandatory by refusing materials for oil or gas production

Pratt Named Secretary of 'Pennsylvania Grade' Association

Wes W. Dunlap

Special to NPN

OIL CITY, Pa.—Appointment of Samuel F. Pratt as general secretary of the Pennsylvania Grade Crude Oil Assn. was announced following a meeting here Jan. 29 of the association's board of directors. His appointment filled a post which had been vacant since the death last summer of J. E. Moorhead. At the same meeting, Wes W. Dunlap, the associations' publicity director, was appointed assistant secretary.

Mr. Pratt served as the association's European manager from 1936 until the summer of 1939, just before the outbreak of the war. He has been with the association for 10 years, first as a representative of the field service division in St. Louis and Philadelphia and later as manager of this division. He was appointed assistant manager after his return to Oil City from his overseas post. A native of Titusville, he has lived in the oil region most of his life.

Mr. Dunlap came to Oil City in 1934 from the publicity department of Pennsylvania State College. He succeeded Mr. Moorhead as publicity director at that time. Prior to coming East, Mr. Dunlap worked on newspapers in Wisconsin and Minnesota.

Samuel F. Pratt

to any operator who did not file a return. The reports were controlled by district offices through assignment of serial numbers to each operator when he reported his inventory.

It is estimated that 5078 serial numbers have been assigned all over the country, although it is said only about 4600 companies are covered because each district office assigned a serial number to each report received by it and large companies reported to various districts.

Reports by producers covered new or used casing, tubing, drill pipe, line pipe, drive pipe or merchant pipe.

Strong Points in Plan Cited

"Idle or surplus inventory must be available to any supplier as defined in Preference Rating Order No. P-98b or to any qualified operator under that order or for other more essential war purposes . . .

"An operator who has not filed the inventory as herein required will be denied authority to acquire or use materials for oil or gas production."

Louisiana Quota Exceeds PAW's But Kansas, Oklahoma Adhere

NPN News Bureau

TULSA — Louisiana's February allowable has been boosted 1204 b/d from January to 340,857 b/d, 8943 b/d below PAW recommended production, according to conservation proration order. Of this total, North Louisiana fields were allocated 84,718 b/d and South Louisiana fields 256,139 b/d. Estimated underproduction of crude is 12,500 b/d, and production of hydrocarbons other than crude oil, 31,000 b/d.

Oklahoma quota for February was set at 395,300 b/d, 5300 bbls. below January, with 30,000 b/d allocated to production of petroleum liquids other than crude oil.

Kansas quota was set at 310,500 b/d, up 500 b/d over January, with 5400 b/d allocated to production of petroleum liquids other than crude. Kansas Corporation Commission official said this was highest quota in state's history. Both states followed PAW recommendation.

New Mexico Sets Allowable

Special to NPN

SANTA FE — New Mexico's Oil Conservation Commission has set February allowable at 105,800 b/d. This is 500 bbls. above January and the same as recommended by PAW, according to J. M. Kelly, commission director.

Texas Hearing Set for February 18

Special to NPN

AUSTIN — Exact date of the next statewide proration hearing to consider March allowables has been set for Feb. 18, Chairman Beauford Jester of the Texas Railroad Commission announces.

The session will be held in the Blackstone hotel at Fort Worth.

O'Mahoney Maps Fight To Increase Price Of Wyoming Black Oil

NPN News Bureau

WASHINGTON — Sen. O'Mahoney is preparing to press for early action on his recommendation for a crude price boost for Wyoming black oils. To NPN he expressed impatience at the delay of PAW Ickes in urging such action to OPA.

At the same time Sen. O'Mahoney believes Price Administrator Prentiss Brown would be favorable to the proposal.

Sen. O'Mahoney's recommendation was made following hearings by his oil investigating committee late last summer. He pointed out the possibility of relieving the Eastern oil shortage by adjusting prices and revamping transportation methods.

"Events have shown," he told NPN, "that the committee was ahead of the planners."

Development of Wyoming black oils has been throttled by low prices, he said, at a time when fuel oil and asphalt are needed for military, industrial and civilian uses. OPA froze the price level as of Oct. 1, 1941, when black oils were not needed, he pointed out.

"Wyoming has 27 blackoil fields," he said, "with estimated reserves of 261,000,000. But the present low price of 50c or under in most fields is not enough to move the product. Seven fields are shut in and only 330 wells are producing in all blackoil fields.

"On the conservation formula of not more than 1 well to every 40 acres 385 additional wells could be drilled increasing daily output by 45,000 to 50,000 bbls.

"This oil could be treated in Wyoming refineries and could be used as could light oils also to supply markets west of the Mississippi River, while Texas and Midcontinent oils with pipeline outlets could be concentrated on New England and other Eastern areas now facing distress."

California Seeks 50-68c Boost In Crude, Refinery Prices

NPN News Bureau

LOS ANGELES—Increases of 50c per bbl. in ceiling prices of California heavy crude containing 100% fuel oil, gas oil, and asphalt; 68c per bbl. increase in the base refinery ceiling; and increases on all other California crude oils of at least 90% of the estimated increases resulting from the foregoing increases, are being sought from "appropriate federal authorities in Washington" by the California Oil & Gas Assn., according to a resolution passed unanimously at a meeting of the board of directors at Los Angeles.

To meet the growing demand for California petroleum products occasioned by the war, the association urges intensive exploration and drilling; rehabilitation and repair of old wells; decrease in abandoned marginal wells; renewed production of shut-in, unprofitable wells; and rapid development of presently proven oil reserves.

To accomplish these objectives, the association asks, besides the higher price ceilings, an assurance from Congress that present provisions of the Internal Revenue Code providing for percentage depletion allowance and the option to expense intangible development and drilling costs be retained; the lifting or relaxation of present governmental restrictions on the use of existing equipment and material; new materials and equipment and in such quantity as may be necessary; and the maintenance and augmentation of all necessary manpower, particularly skilled labor.

Texas House Asks Increase In Crude Price Ceiling

Special to NPN

AUSTIN—Any moves for a general raise in the price ceiling on crude oil has the blessing of the Texas House of Representatives.

Without a dissenting vote, the House has approved a resolution by Rep. Bell of San Antonio asking Texas congressmen to urge OPA to lift the price. Rep. Bell said he believes Prentiss Brown is a "man of understanding" and laid the blame for the present oil price on Leon Henderson. "He was presented with truckloads of evidence yet arbitrarily failed to do anything," Rep. Bell told the House.

OPA Permits Price Hike On Crude in 4 States

NPN News Bureau

WASHINGTON — Higher ceiling prices for crude oil at receiving tanks in certain Texas, Louisiana, Kentucky and Arkansas pools were established by OPA in Amendment 64 to Revised Price Schedule No. 88, issued Jan. 28 and effective Feb. 3. No increases in prices at resale levels were made. Price changes are as follows:

Rincon Field, Starr County, Tex., 40 gravity and above increased from $1.32 to $1.45, with customary differentials for lower gravities.

South Arkansas—McKamie, Dorcheat, Macedonia and Big Creek pools, sour distillate (57 to 68 gravity) increased from $1.15 to $1.25.

Olla, Little Creek and South Olla pools, LaSalle Parish, La., 40 gravity and above increased from $1.30 to $1.35. Customary differentials allowed for lower gravities.

Shields Field, Nueces County, Tex., 40 gravity and above increased from $1.25 to $1.35, with customary differentials for lower gravities. New price retroactive, effective Dec. 1.

Sebree pool, Webster County, Ky., increased from $1.25 to $1.32. New price retroactive, effective May 1, 1942.

According to OPA, the crude oils from the affected fields have in general had a single purchaser. The purchasers and producers involved have indicated that no price increases at resale levels will be requested, OPA said.

OPA also explained that the pools are isolated instances where production was frozen at price levels which are abnormally low, or where normal relationship to crudes of comparable grades was not properly reflected.

THERE IS A BRIGHTER BUSINESS FUTURE for DISTRIBUTORS and DEALERS Under The Diamond D-X Flag

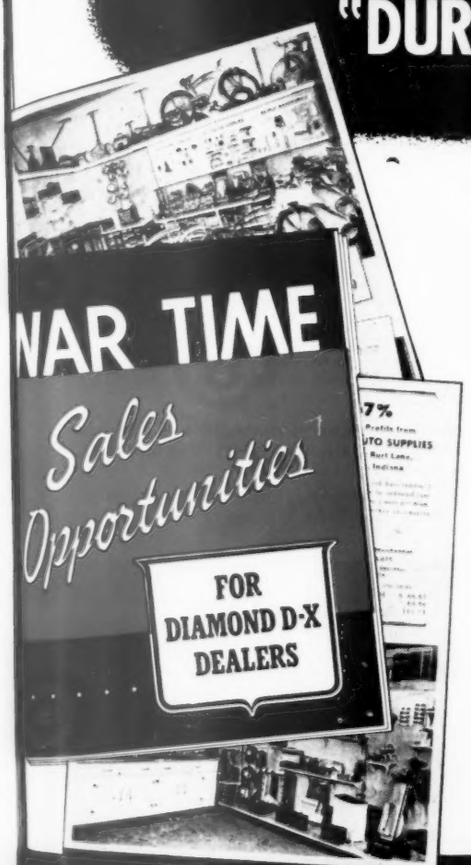
D-X LUBRICATING MOTOR FUEL

DIAMOND 760 SOLVENT PROCESSED MOTOR OIL

Are you looking for the petroleum supplier who has developed, tested and now offers new and progressive plans for increasing sales—in spite of wartime difficulties? Mid-Continent Petroleum Corporation has developed new and comprehensive plans to help its distributors and dealers meet today's problems. "Business as usual" is not the answer, but there are opportunities galore for aggressive distributors and dealers who will adjust their businesses to wartime conditions. Let Mid-Continent show you how profits can be made—now—under the Diamond D-X flag.

HIGHEST QUALITY PETROLEUM PRODUCTS, HOME AND AUTO SUPPLIES

PROVED—TESTED MERCHANDISING PLANS FOR "DURATION" BUSINESS



The booklet "War Time Sales Opportunities," presenting new sales-making merchandise, is but one of many promotional and advertising helps for Diamond D-X distributors and dealers. Others include Slide Films, Business Systems, Consumer Advertising, Complete Sales Promotion Campaigns, Sales and Service Manuals and Sound Motion Pictures, telling and showing how to build neighborhood business. All are practical—tested and proved plans—they have worked for others, so why not put them to work for you?

A Diamond Representative Will Bring You The Facts DIRECT—Upon Request

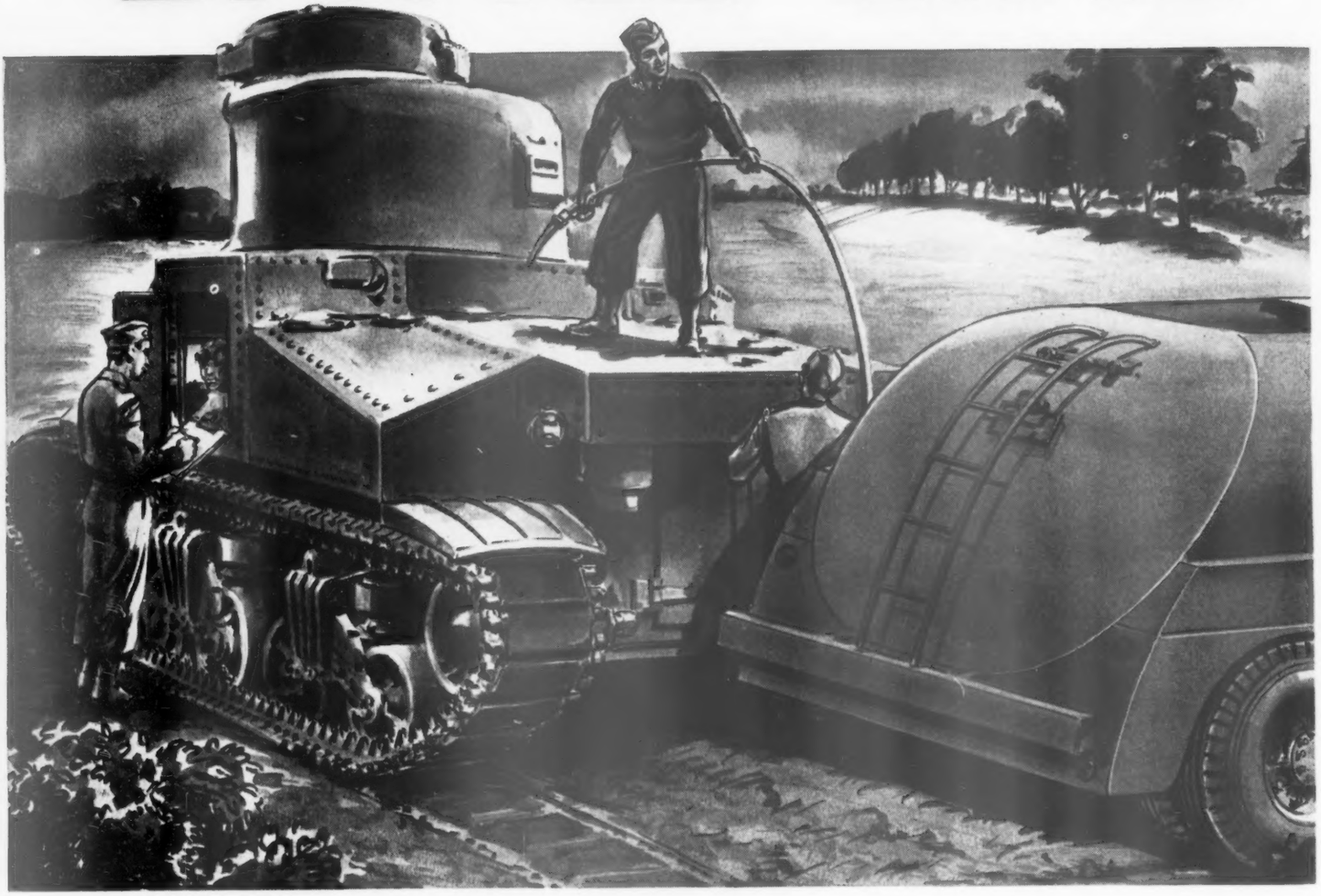
There will be no obligation on your part. Just wire, phone or write and a Diamond Salesman will arrange to give you a private, confidential showing of all this material in your own office. We believe you'll find it worth a "second look." Address the Mid-Continent office nearest you.

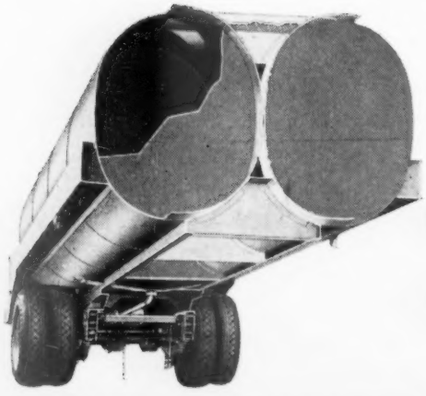
BNB
From the Ground to You
U.C.L. AT NO EXTRA COST!
Lubricating
PROFITS From Guaranteed Lubrication
Profitable DRIVEWAY SELLING
FUELS to Build Customers and Sales
WAR and YOUR CAR
YOU'RE IN BUSINESS FOR YOURSELF
YOU CAN TELL BY THE LOOKS

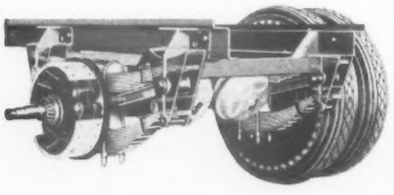
MID-CONTINENT PETROLEUM CORPORATION

CHICAGO OMAHA TULSA WATERLOO

BATTLE LINE







• Butler Twin-Tank construction gives you the only transport with I-beam integral frame deeper than the tank body and a 20 to 1 factor of safety.

Two-Step Springing gives Butler Twin-Tank Safety Transport a soft, floating ride when traveling empty—frees it of road shocks, lengthens its life.

All Americans can well be proud of the General Grant, the General Sherman and the General Stuart battle tanks. On the desert and in the jungle they outperform, by a wide margin, the best our adversaries can offer.

Helpless juggernauts they become, however, the moment their fuel tanks or crank cases go dry. Each one requires the services of at least a 1000 gallon truck tank or trailer tank, either for direct refueling or to refill thousands of portable gasoline cans cached at strategic points. There are no filling stations where the tanks, the M-7 self-propelled cannon, the combat cars and the warplanes fight.

From what it is called upon to send, the oil industry well knows that it is the best of everything that goes to war.

So it is that Butler Refueling Units of all types, truck and Trailow and Twin-Tank Transport, are keeping

BUTLER BUILT

BUTLER MANUFACTURING COMPANY... Factories: KANSAS CITY, MO.

RENDEZVOUS

battle line rendezvous day and night with our mechanized fighters. Butler Refueling Units are performing what is proving to be one of the most vital roles in modern warfare.

On the home front too, big fleets of Butler Built Transport Units are helping to offset in a big way the preying of submarines on coast-wise tankers. Kept rolling 24 hours a day Butler Twin-Tank Safety Transports have time and again demonstrated their ability to release up to 20 tank cars for long hauls.

Also, Butler Twin-Tanks have well demonstrated their ability to keep rolling 24 hours a day. From the beginning they have been soundly engineered for just that kind of service.

MORE TWIN-TANKS NOW AVAILABLE

Another good stock of Butler Twin-Tank Safety Transports with Two-Step Springing is ready for delivery on your Certificate of Transfer (P. D. 321 Forms). Today, when every unit of Transport equipment is under terrific strain, your best insurance against down-time is Butler-Built transport equipment.

For prompt handling address all inquiries to:

1241 Eastern Ave., Kansas City, Mo.

941 Sixth Ave., S. E., Minneapolis, Minn.

☐ Send Butler Twin-Tank Safety Transport Book.
☐ Send information on securing Certificate to buy Transport.
☐ Send Truck Tank Book.

Firm Name _____

By _____ Title _____

Address _____

City _____

State _____

TWIN-TANK *Safety* TRANSPORTS

GALESBURG, ILL...MINNEAPOLIS, MINN. Sales Offices: WASHINGTON, NEW YORK, CHICAGO, ATLANTA AND SHREVEPORT. Export Office: 8 So. Michigan, CHICAGO

Increased Wildcatting, Despite Risks, Urged by Chemists

NPN News Bureau

NEW YORK — Wildcat drilling should be encouraged by every means, in spite of the impossibility of predicting the results of any particular expenditure of money, labor and materials and the probability of a serious time lag between the exploration effort and the development of a supply of crude to remove the danger of a shortage of petroleum for war purposes.

This is the action urged by Dr. Benjamin T. Brooks, consulting chemist of New York, and Dr. L. C. Snider of the University of Texas, following a survey. Their conclusions are published in *Chemical and Engineering News*, publication of the American Chemical Society.

There is almost a certainty that sufficient petroleum can be produced to meet all the war demands of our armed forces, Lend-Lease requirements, and essential civilian needs in the U. S. during the next 2 years, they said.

But, in view of the sharp decline in the rate of finding new fields and the decreasing production of existing fields, "it is equally certain that the critical rate of production of many fields will be exceeded with damage to such fields and with lower net ultimate production," they added.

The two chemists pointed out that gasoline and fuel oil rationing are due to lack of transportation and the temporary need for the conservation of rubber, and that the situation in regard to crude should not be confused with the primary causes of rationing.

Warn Against Over-Production

"Drilling of proved locations and producing all wells to capacity will postpone a serious shortage for some indefinite but probably relatively short time, but at great loss of reserves which could be recovered if the wells were produced at their critical or optimum rate, rather than their maximum rate," the report says.

"The skirmish over alcohol motor fuel has subsided, and our expanded manufacturing capacity for alcohol is already severely taxed to supply other essential war needs. Methods of alleviating a petroleum shortage by improved technology, the increased hydrogenation of oil residues, and the manufacture of oil from coal and shale evidently depend upon much higher price levels over a considerable period of time."

Hike Quotas To Fill Pipeline

Special to NPN

AUSTIN—Texas Railroad Commission has increased allowables 10,000 b/d in fields producing Anahuac type crudes to fill the 24-in. pipeline to capacity. Commission announced on Jan. 30 that these fields were affected by the new allowables: Pierce Junction, Anahuac, Red Fish Reef, Cedar Point, Fisherman's Reef.

Court Rules Use of Surface Granted in Mineral Rights

Special to NPN

SPRINGFIELD, Ill. — State supreme court has ruled that documents conveying coal, oil, gas and other mineral rights grant use of surface rights for drilling or mining operations, whether or not expressly provided for in the deed.

The opinion was rendered in John Jilek, et al, vs. Chicago-Wilmington & Franklin Coal Co., appellees, seeking to quit title involving ownership of oil and gas. The opinion stated:

"There appears to be little doubt when the mineral estate is severed from the surface estate, that with the mineral estate, all means to attain it are granted for the purpose of enjoying it.

"This is because it is presumed the grantor intended to convey, and the grantee expected to receive, the full benefit of the mineral estate, and therefore the grantor not only conveyed the thing specifically described, but all other rights and privileges necessary to the enjoyment of the thing granted."

Ruling also said that express permission in the deed to mine coal did not exclude the right to drill for oil. In severance of mineral and surface estates, the court held oil and gas must also be considered a part of the mineral estate.

Arkansas' Oil Reserves Highest in 20 Years

Special to NPN

EL DORADO — The reserve of oil and condensate in the 6 oil producing counties of Arkansas reached in 1942 its highest point since the Smackover boom 20 years ago, the state's oil and gas commission reported Jan. 25.

This reserve was 405,000,000 recoverable barrels on Jan. 1, 1943, excluding any secondary recovery projects such as recycling, water flooding, pressure maintenance, etc., which would increase this figure.

While oil discoveries in 1942 totaled 76,000,000 bbls., only 34% or 26,579,000 bbls. of this amount, was produced, the highest production in 14 years. Wells drilled totaled 148 and 142 were plugged and abandoned.

The highest runs to refinery stills in the history of the state was reported for 1942, reaching 13,000,000 bbls.

Casinghead gas and natural gasoline production showed large increases the past year, gaining 8 billion cu. ft. and 6,000,000 gal. respectively over the previous year.

Phillips Buys Capital Stock Of Broderick & Calvert

Special to NPN

FT. WORTH — Purchase of all the capital stock of Broderick and Calvert, Inc., here, from Mrs. Elizabeth Broderick and George Calvert for a price of approximately $3,000,000 cash, is announced by Phillips Petroleum Co.

Negotiations have been substantially completed for the Sunray Oil Co., Tulsa and Ft. Worth, to take one-fourth of the stock.

The Broderick & Calvert producing properties comprise 101 producing wells on 2840 acres in the Foster, Harper, North Cowden and South Cowden pools of Ector County, West Texas. In addition, Phillips acquired 4200 acres of non-producing leases in West Texas except a block near Grosbeck, in Limestone county.

This is the third important acquisition of producing properties in West Texas' Permian basin by Phillips in the last month, company officials said. A week ago purchase of the W. H. Dunning, Jr., estate for $1,265,000 was reported and late in December Phillips and Sunray bought the stock of the Alma Oil Co., which included four properties in West and North Texas.

N.G.A.A. Publishes Method For Measuring Gas

NPN News Bureau

TULSA — A tentative standard method for calculation of high pressure gas measurement, entitled "N.G.A.A. Tentative Method for Calculation of High Pressure Gas Measurement", has been adopted and published by Natural Gasoline Assn. of America.

Based for the most part on the paper "Suggested Standard Method for Calculation of High-Pressure Gas Measurement", presented by Dr. D. L. Katz, University of Michigan, before the annual meeting of the N.G.A.A. in Tulsa, May 14-15, 1942, it appears as an informal discussion of procedure with supporting data and bibliography rather than the stylized form generally adopted for such standards.

The method appears in two parts, the first being the tentative standard method for obtaining orifice correction factors, combined with gravity and temperature factors to simplify calculation. The second part deals with the detailed investigation of reliability of the compressibility factor method for gas density calculations.

Copies of the standard may be secured from the association at its offices in Tulsa, 922 Kennedy Bldg.

Texas Polution Laws Voided

Special to NPN

AUSTIN—Three penal code articles dealing with the pollution of fresh water streams have been knocked out by the Court of Criminal Appeals, which ordered dismissal of prosecution against B. B. Stevenson, Smith county soil operator.

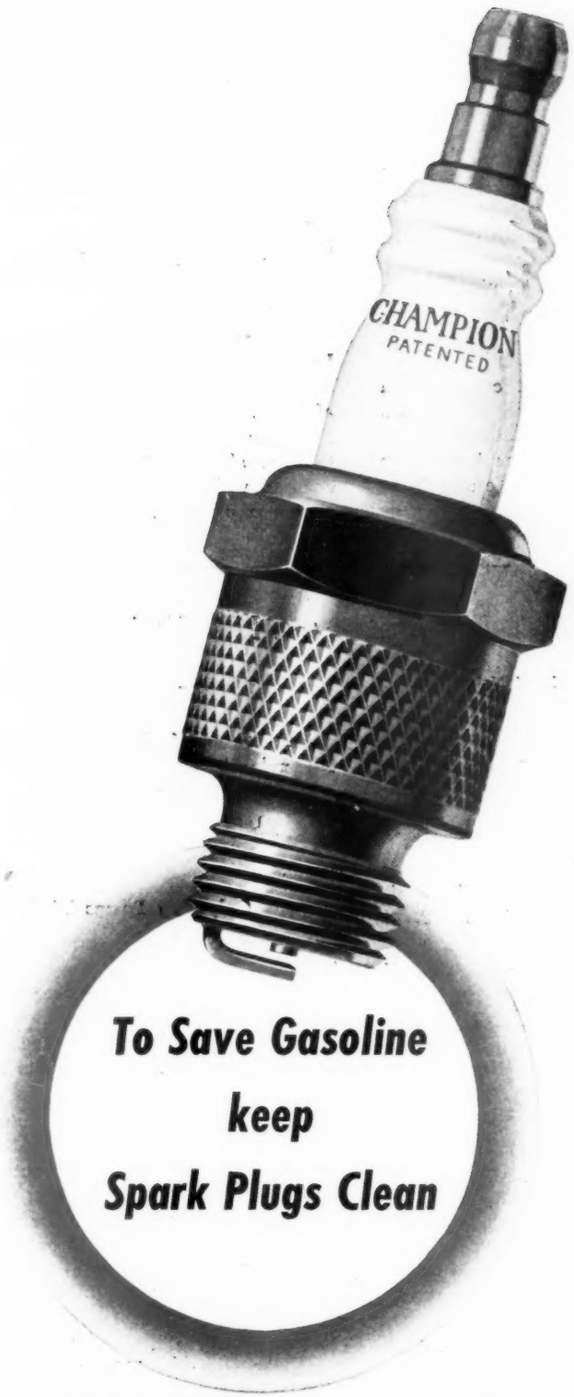
The court, ruling on Stevenson's appeal from a fine of $300 levied by lower court, held that Articles 697, 698, and 698-A all define the offense of pollution but each provides a different penalty and therefore are so indefinite as to be inoperative.

U. S. Crude Stocks Rise

NPN News Bure

WASHINGTON — U. S. and foreign crude stocks increased 886,000 bbls. during the week ended Jan. 23, totaling 233,733,000 bbls., Bureau of Mines reported Jan. 29.

Texas stocks showed a rise of 1,002,000 bbls., totaling 104,331,000 bbls. Only other substantial increases were Illinois-Indiana area, up 236,000 bbls.; and Oklahoma, up 117,000 bbls. Drops were recorded for Rocky Mountain Area, down 219,000 bbls.; and Kansas, down 190,000 bbls.



Every dealer who stocks and sells Champion Spark Plugs will be gratified to learn of their outstanding records with our armed forces.

Champions are on active duty on every front.

Champion Aircraft Spark Plugs are serving with distinction in the air forces of the U.S. Army and Navy in planes of every type and size.

Their top-flight performance, extreme dependability and unusually long life have been deemed especially noteworthy by these branches of the service.

In the wide variety of gas-engine-powered boats being used by the Army, Coast Guard, Navy and Marine Corps, Champion-equipped engines are in the majority, as they have long been in marine engines everywhere.

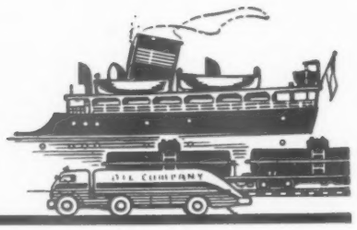
In jeeps, trucks of all sizes and types, in swift tank destroyers, in heavily armored and armed tanks, and all the mechanized vehicles which make ours the finest fighting force in the world, Champion Spark Plugs are synonymous with better performance and dependability.

Thus Champions are now demonstrating by the two qualities that have always distinguished them—better performance and dependability—their primary right to top market position. It pays you well to stock and sell Champions.

The salvaged metal from
worn-out plugs
Will help to make more tanks;
And they'll be used to shoot
more slugs
Into those Axis cranks.

CHAMPION SPARK PLUGS

Oil TRANSPORTATION



Second Pipeline

WPB Approves Construction of Products Pipeline from Texas to Illinois; Final Review on Extension to East Postponed Pending Study of Overland Hauls

NPN News Bureau

WASHINGTON — WPB approved construction of the 20-in. products pipeline from Texas to New York, but extension of the line to the Atlantic Seaboard will be determined by reports of how other overland carriers functioned through the winter.

WPB approved the 20-inch line on Jan. 26, subject to final review by the requirements committee. PAW says it feels that need for the Texas-Illinois section has been definitely established.

"But it was considered advisable to postpone recommendation of the full Texas-East Coast span for petroleum products until additional data on operations of all petroleum carriers through the winter could be secured," PAW said.

Here are statistics on the products pipeline from Texas to Illinois:

Size—20 in.
Length—836 miles.
Capacity to Illinois—235,000 b/d.
Cost—$44,000,000.
Start of construction—March.
Completion date—September, provided work starts and continues on schedule without interruption.
Financing—RFC.
Construction agency—War Emergency Pipelines, Inc.
Route—Between Beaumont-Houston, Tex., and Norris City, Ill.-Seymour, Ind.

Feeder lines will tie into the 20-in. line in the Beaumont area. One, 83 miles long, will be of 16-in. pipe from Houston to Beaumont. Another will be of 10.75 in. line, 32 miles long, between Port Arthur and Beaumont. Refinery tie-ins near Baytown and Texas City will be 34 miles long, of second hand 8⅝ in. pipe.

PAW said plans call for use of seamless steel tubing in constructing the main 836-mile line, but welded pipe will be installed if seamless cannot be obtained.

Although rated daily capacity to Illinois is 235,000 bbls., actual delivery to the East Coast, which will be by tank car, will represent a net increase in rail movement of 110,000 b/d, PAW said.

Carrying light products, the line for more than half of its length will parallel the route of the 24-in. crude pipeline.

The pipeline, first suggested officially by PAW Ickes immediately after approval of extension of the 24-in. crude carrier from Illinois to the East Coast, went to WPB with Mr. Ickes' report that it was the surest means—in terms of material, manpower and oil delivered—of meeting military and essential civilian demands next winter.

Mr. Ickes described the 20-in. pipeline as a " 'must' in the comprehensive oil-for-war program of the Petroleum Administration".

Piece-meal construction, used in building the 24-in. line by giving different contractors a certain section to build, will be used on the products pipeline.

Along the route will be 16 pumping stations with 44 motors and pumps capable of producing 55,000 h.p.

Oil Flows in Ohio Emergency Line

NPN News Bureau

WASHINGTON — Gasoline pipeline between Akron and Fostoria, Ohio, went into operation Jan. 23, six months after it was started.

This announcement came from Federal Loan Administrator Jones whose Defense Plant Corp. financed the $1,400,000 project of PAW. Pipeline will be operated by Ohio Emergency Pipeline Co.—owned by Standard Oil Co. of Ohio, Sun, and Shell—and will connect with Ohio Standard and Sun Susquehanna pipelines.

How 'Big-Inch' Line Shipments are Handled

NPN News Bureau

WASHINGTON—The 24-inch pipeline from East Texas to Illinois will be neither a common carrier nor a private carrier, buying heating oil and crude in East Texas and selling it laid-down on the East Coast with the last leg of the movement by tank car.

Best description of the "big inch" line is "a publicly-owned private carier," says a PAW spokesman.

Defense Supplies Corp., RFC subsidiary, will buy the oil as delivered into storage tanks at the Longview, Tex., terminal. Price will be based on seller's costs plus accumulated transportation charges. DSC will not buy directly from producers nor post a price for crude it buys, he said.

DSC will sell the fuel oil or crude on a delivered price basis which will be equivalent to cost of all-rail shipment from East Texas to same destination, the PAW spokesman explained. Purchases will apply to DSC for compensation for war-added costs in excess of their normal, peacetime transportation costs. Whatever differential there is between the pipeline-rail movement and all-rail will be retained by DSC to offset somewhat the compensation it is paying on substitute transportation under the RFC subsidy plan.

Feeder Lines Privately-Owned

While the "big inch" line is "publicly owned" the principal feeder lines are privately owned. There are four of these, tieing into a 16-in. extension of the "big inch" south of Longview.

Three of these feeder lines are reversed pipelines which formerly moved crude south from East Texas. They are the Shell and Pan-Am lines now running from Houston to East Texas and the Sun-Stanolind (formerly Yount-Lee) line from Beaumont to East Texas. At the outset, these 3 lines will carry heating oils.

The fourth line, Atlantic Refining's, from Atreco, Tex., up into East Texas, will carry crude.

All of these 4 feeder lines are approximately 195 miles long.

PAW will designate who is to supply the lines, and how much; also who is entitled to purchase at the receiving end, and how much.

Only Few Pumps Working

Although the line is completed from East Texas to Norris City, Ill., only a few of the pumping stations are operating yet. Filling the line has started. The first oil well probably arrived at the northern end around Feb. 10, according to PAW. But the date is not definite yet.

Because of this, February deliveries at northern terminal will average about 50,000 b/d, which means a net increase of about 17,000 b/d in tank car deliveries to the East Coast (tank car turnaround is shortened from 18 to 11 days, or 39%), PAW points out. In March, "big inch" pipeline deliveries are expected to average about 150,000 b/d, a net gain of about 58,000 b/d in tank car deliveries to East Coast. The line is expected to be operating at capacity—300,000 b/d in April.

Asks Permit to Buy 2 Million Cans To Haul Kerosine to East

Special to NPN

HAWTHORNE, N. J. — Shotmeyer Bros. Petroleum Co. here has wired WPB Chief Nelson for permission to purchase two million 2-gal. containers—either tin or glass—for shipping kerosine to the East Coast in box cars.

"This means faster distribution either by peddler or grocery store to small user. It will also eliminate tank cars," the company's wire stated.

Copy of wire was sent to PAW Supply Chief Robert Minckler.

HOT OFF THE PRESS!

A Complete Directory of Everyone Connected with All War-Oil Agencies of Government and Industry

With Correct Titles, Committee Members, Company Connections, Addresses and Telephone Numbers.

Easy to Use . . .

What Washington official do you want to write?

What government war agency branch official do you want to telephone?

"PLATT'S WAR-OIL HANDBOOK" makes it all so easy! The front cover gives the table of contents so that you can quickly flip the pages to any agency or organization.

In the back of "PLATT'S WAR-OIL HANDBOOK" is a complete index which list names of all individuals in the book. This index is crossed by all subject heads as well.

So simple to use! Your secretary, your switchboard operator, may save hours the first week, as the necessity for leafing through files and papers in search of a government official's address is eliminated.

Following is a list of subjects covered:

- Petroleum Administration for War
- PAW District Offices
- PAW District Committees
- Office of Defense Transportation
- ODT Regional and District Offices
- Office of Price Administration
- OPA Regional Offices
- War Production Board
- WPB Regional Offices
- Office of Rubber Director
- Reconstruction Finance Corporation
- Defense Supplies Corporation
- Office of Lend Lease Administration
- National War Labor Board
- War Manpower Commission
- War Shipping Administration
- Board of Economic Warfare
- Office of War Information
- War Department
- Navy Department
- State Department
- Department of Justice
- Interstate Commerce Commission
- Capitol
- U. S. Tariff Commission
- Interstate Oil Compact Commission
- State Oil Conservation Offices
- Petroleum Industry War Council
- P.I.W.C.—Committees
- Oil Company Representatives in Washington
- Oil Associations in U. S.
- Refinery Registry
- List of Oil Orders Issued to Date
- Executive Oil Orders
- Most Frequently Called Oil Co. Phone Numbers

PLATT'S WAR-OIL HANDBOOK

GIVES the key personnel in all branches of government and its war agencies, and the personnel in all organizations and committees of the oil industry, that concern the relationship of the oil industry and the government in this War Effort.

Corrected to Feb. 1st, 1943. Future editions will be issued as necessary to keep up with the changes in the industry's and government's war machinery.

This War-Oil Handbook is designed to be on the desk of every oil executive, his secretary, and his stenographers. They will not have to search files and old lists and letterheads for names, correct initials, titles, and addresses.

This War-Oil Handbook also should be on the desk of every one putting through telephone calls, particularly long distance calls at the PBX switchboards, so as to save your time and the telephone company's time in calling by number direct, and not through the phone company's "information operator."

Price is only $2.25 and less in quantities. Check your requirements against the low quantity prices below. Then clip and mail coupon today.

Quantity	Prices
10 to 24	$2.10 each
25 to 49	1.95 each
50 and over	1.90 each

Prices subject to change without notice. F.O.B. Cleveland. Ohio purchasers add state sales tax.

Single Copy

$2.25

Platt's War-Oil Communication Services,
1213 West Third Street, Cleveland, Ohio.

Ship me ..... copies "PLATT'S WAR-OIL HANDBOOK" right away. Check is attached for $.....

Name .....

Company .....

Address .....

City-State .....

Platt's

WAR-OIL COMMUNICATION SERVICES

Time out for a drink of water at the Maloney oil investigating committee hearings—John J. Pelley (left), president of Assn. of American Railroads, chats with Sen. Maloney, Conn., chairman

Pelley Sees 900,000 b/d to East

NPN News Bureau

WASHINGTON — Within 30 days, eastern tank car movement will reach 900,000 b/d, John J. Pelley, President of the Assn. of American Railroads, told Senator Maloney's oil investigating committee Jan. 27, adding that he would be "surprised if the movement does not exceed 900,000 b/d and disappointed if it doesn't reach 1,000,000 bbls. a day". Sen. Maloney questioned him carefully on this point.

Mr. Pelley explained the increase he expected over the 770,000 b/d (average for the last 7 weeks) as follows:

Use of 500,000 drums to haul oil in box cars will mean an increase of 20,000 b/d; new unloading facilities in the East from Norfolk, Va., to Portland, Me., will account for an additional 25,000 b/d; completion of the "big inch" from Longview, Tex., to Norris City, Ill., will mean a net increase of 43,000 b/d to the East and the addition of more tank cars for eastern service by additional substitution of tank trucks will boost the movement another 20,000 b/d.

These figures, Mr. Pelley said, added up to only 878,000 b/d but he thought they were conservative and that the 22,000 b/d additional would be gained in increases in the figures he submitted.

Tank Car Hauls to East Coast Drop to 798,582 b/d

NPN News Bureau

WASHINGTON — Rail hauls of crude and products into the East totaled 798,582 b/d during week ended Jan. 23 as compared with 818,331 b/d the previous week, PAW announced, Jan. 29. Total of 39 participating oil companies loaded 25,879 tank cars as follows:

Company	Cars	Company	Cars	Company	Cars
Allied	38	Daugherty Refinery	29	Royal	9
American Bitumuls	82	Gulf	2230	Shell	914
Amsco	296	Hartol	195	Sinclair	2467
Arkansas Fuel	149	Hess, Inc.	16	Socony Vacuum	3128
Ashland Refining	70	Old Dutch	5	Southland	15
Atlantic Refining	2391	Pan American	1878	California Standard	6
Bell Oil & Gas	14	Petrol Corp.	241	Kentucky Standard	139
James B. Berry Sons	7	Petroleum Heat & Power	87	New Jersey Standard	5575
Canfield	1	Phillips	9	Sohio	71
Chalmette	40	Pioneer Asphalt	1	Sun	2205
Cities Service	1046	Pure	109	Talco	42
Conoco	242	Republic	120	Texaco	1019
Crown Central	15	Roosevelt	4	Tide Water	974

Drums for Kerosine Box Car Hauls Released by WPB

NPN News Bureau

WASHINGTON—Box car shipment of kerosine to the East Coast is growing rapidly.

In the first week of the new operations, 97 cars were loaded with steel drums containing kerosine and brought a daily average of 3265 bbls. to New England where the kerosine supply has been tightest.

In the second week of the new operation, shipments grew to 182 cars delivered an average of 4937 bbls. daily.

Army's release of 200,000 steel drums for the new traffic, which costs 15c a gal., has been augmented by WPB approval of 300,000 more drums for this service.

RFC Buys the Drums

RFC, through its subsidiary Defense Plant Corp., is buying the 300,000 drums and already has issued purchase orders for 55 gal., 18 gage drums.

RFC's action, announced Jan. 29 by FLA Jones, was upon the recommendation of WPB and PAW. Mr. Jones said the drums would be used for fuel oil as well as kerosine.

Oil companies, according to PAW, are hard at work in squeezing the last drop of use out of drums in box cars to help relieve the shortage for the rest of the heating season.

"The various oil companies are completing plans and rearranging handling facilities to get the maximum possible volume of kerosine delivered by this method during the remainder of the heating season," PAW said.

Oil Exempt from Order Limiting Hauls By Tank Car, Truck

NPN News Bureau

WASHINGTON — Petroleum, petroleum products and many chemicals used by the oil industry are exempt from a new WPB order (T-1) designed to eliminate "excessive hauling and transportation of less essential materials" in tank cars and tank trucks.

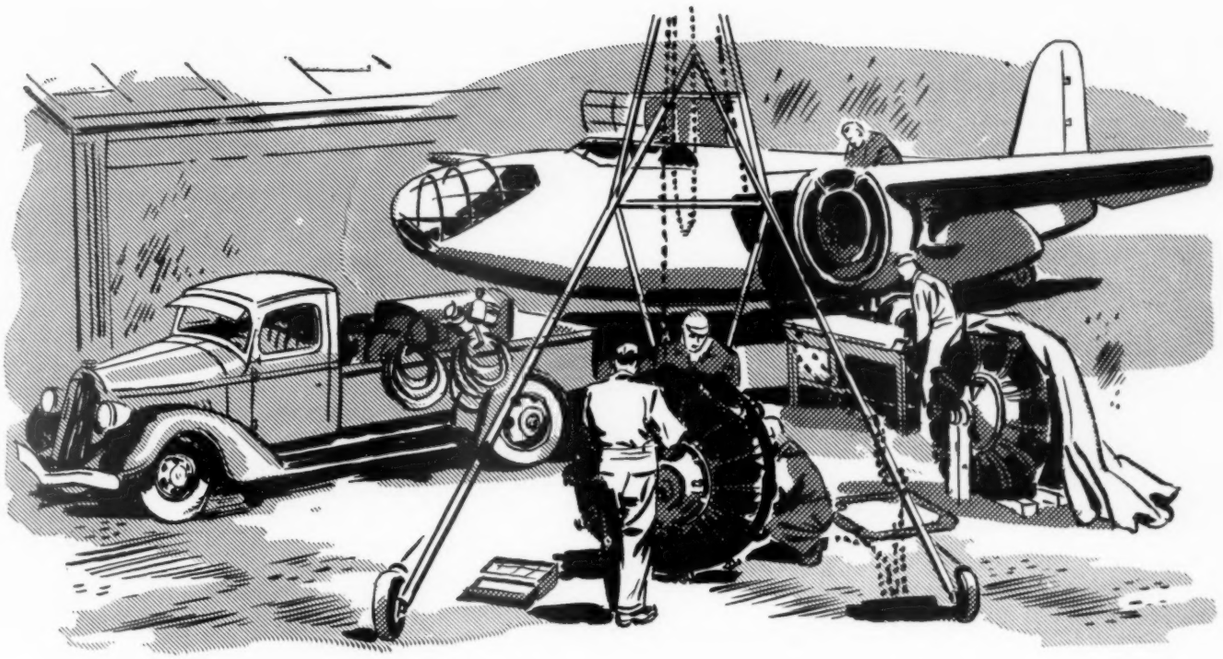
Zones beyond which tank car or tank truck shipment of molasses and caustic soda may not be made without specific WPB approval were outlined in the order. The zoning arrangement for molasses requires approval for any shipment of 200 miles or more, effective March 1, but definite geographical zones were outlined for transportation of caustic soda. Caustic soda restrictions are effective April 1. Molasses restrictions do not apply if the molasses is to be used in citric acid or yeast.

Effective March 1, advance notice must be given WPB of planned tank car or tank truck shipment of acetone, butyl acetate, corn syrup, ethyl acetate, ethyl alcohol and molasses used for citric acide and yeast.

Exemptions Are Listed

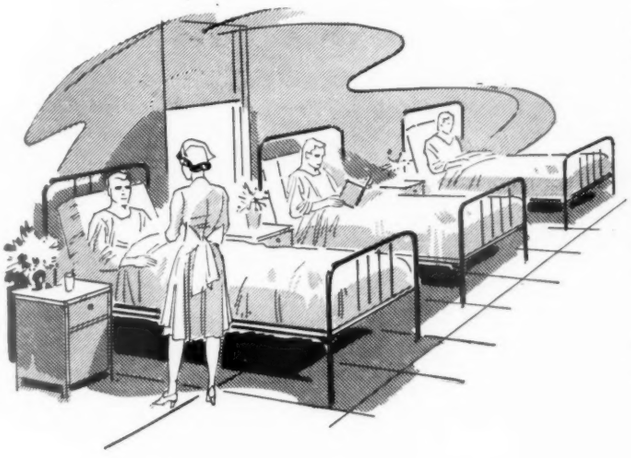
Exempt from the order are:

Petroleum and its products; acrylonitrile; anti-freezing compounds; asphalt; aviation gasoline of 87, 91



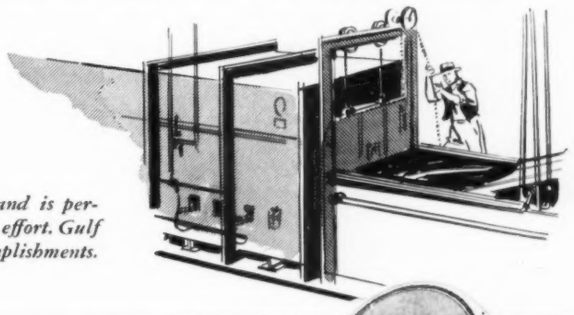
LUBRICATION IS ONLY A PART OF PETROLEUM'S JOB

IN THE FIELD as in the factory numerous new and replacement parts of all mechanized equipment must be "ground in" with exacting care. Aiding in this all-important work are various light lubricating oils which act as carriers for the many abrasives used.



AID FOR THE SICK and wounded—salves and light mineral oils of many types help speed the recovery of our sick and wounded. These, together with ingredients of soaps and toilet preparations, are contributions of the oil companies toward a healthier Army.

FAR BEHIND THE LINES production workers in our iron and steel plants produce the metal so frequently referred to as "the backbone of our war effort." Aiding in this effort are numerous oil products including miscellaneous oils and greases, coal spray oils, wire rope lubricants, quenching oils and rust preventives.



★ *The American petroleum industry has undertaken—and is performing—huge tasks of immense importance to our war effort. Gulf takes deep pride in its privilege of serving in these accomplishments.*

GULF OIL CORPORATION
GULF REFINING COMPANY

★ **Victories Are Costly, Too—Buy War Bonds** ★

and 100 octane and component parts such as alkylate, aromatic fractions, aviation base stocks, butylene, codimer, isobutane, isobutylene, isooctane, isopentane (pentane) and hydrocodimer; brake fluid; butadiene; butanes; butenes; crude napthalene; ethyl methyl ketone; furfural; gas drip oil, including crude; tetraethyl lead; liquefied petroleum gases; methyl isobutyl ketone; naptha; naptha solvent; napthalene solvent; napthalene, including crude; oil tar; chlorinated paraffin wax; pentane; propanes; synthetic resins; road tar; rubber solvent; styrene; toluol; and xylol.

In issuing the order on Jan. 30, WPB was careful not to step over the boundary between its duties and OPT's sphere, by applying the order to shippers and not to carriers.

"While Order T-1 relates only to steel tank cars and steel tank trucks, it sets up the framework by which any type of shipment can be regulated as the need may arise," WPB said.

Trucking Boom

Oil Truck Traffic Climbs 100% in '42 but Manpower Problems Grow More Acute and Training Programs Must Be Pushed, ODT Personnel Chief Says

NPN News Bureau

WASHINGTON—Petroleum transporters reporting to ICC showed nearly a 100% increase in traffic in November, 1942, compared with the same month in the preceding year, according to ODT Transport Personnel Director Otto S. Beyer who used the figures to emphasize the labor shortage.

A 23% increase in November traffic over the corresponding month of 1941 was reported by 202 motor carriers in 42 states which reported to ICC, Mr. Beyer said.

Turning the figures to advantage in laying emphasis upon the growing manpower needs of motor carriers, Mr. Beyer said the training of new workers—especially drivers and mechanics—is the major problem of the for-hire trucking industry.

Claims Training Programs Are Spotty

November employment reports from 650 carriers representing 20% of total employment in for-hire trucking field indicates that an additional 23,000 employes will be needed during the 12 month period ending November, 1943.

Mr. Beyer said training programs among truck concerns are spotty, and the industry has not met the problem of training an adequate number of drivers for heavy or specialized equipment, or of instructing mechanics needed for maintenance and repair work.

In line with the need for training mechanics, National Automobile Dealers Assn. suggested one means of overcoming the shortage is to concentrate skilled labor on jobs that require those skills, leaving lesser tasks to men and women who have not developed full skills.

N.A.D.A. said automobile dealers with repair shops should use older men, boys, women, and physically handicapped persons as much as possible.

Nearly 75% of the mechanics working for dealers a year ago have gone elsewhere, and new workers have brought employment of mechanics up only 54% of what it was a year ago, N.A.D.A. said.

Fight Truck Haul Limitations

Proposals To Hold Truck Hauls Back to 250 or 300 Miles Meet Active Opposition. ODT Awaits Counter-Proposal as Committee Studies Plan

NPN News Bureau

WASHINGTON — Active negotiations are under way to emasculate proposals for an arbitrary limit of 250 or 300 miles on truck hauls.

Under discussion jointly by American Trucking Assn., railroads, and ODT is a plan for rail-truck coordination which means, in its simplest terms, that transportation of a given shipment would be by the carrier best fitted to handle the particular movement.

Two meetings have been held but definite coordination plan has not developed yet.

Committee Studies Plan

A 16-man committee of the A.T.A., which was appointed to study the 250-mile limit plan when it first cropped up, met here on Jan. 20 for further discussion of the plan. The meeting developed into a conference with ODT where a definite coordination plan was suggested.

Another meeting followed on Jan. 27 when rail representatives also attended.

At the first meeting, according to reliable information, ODT Motor Transport Director Rogers communicated with the committee, saying his office was waiting for a counter proposal from truckers to the 250 mile limit on truck operations.

The committeemen then went to ODT where they met with officials who have been working on rail-truck coordination. These officials said they also were waiting for the counter proposal and raised the threat that they were about to submit recommendations to ODT Eastman for the proposed limit on mileage.

Railroads have informed A.T.A. that they are opposed to the 250 mile limit and also doubt the feasibility of having rail-truck committees work out the coordination plans because it would take hundreds of such groups all over the country.

Other Meetings Scheduled

But other meetings are scheduled, and perhaps something else will be devised.

The conferences between railroads, truckers, and ODT are just another angle in the many-faced issue of limits on truck mileage.

Most astounding of the proposals on which the lid has been blown off publicly was the one revealed by Sen. Gillette, Ia., when his rubber investigating committee was holding a hearing recently.

"Some of these government agencies," he said, "who have asked for some immediate action on the part of this committee, have said that there has been seriously advanced within the past two weeks a proposal to take off the roads all bus traffic and all truck traffic."

Since Sen. Gillette's allegation was made, an informal source familiar with the conditions utterance apparently had squelched the prosurrounding the statement said the senator's posals, and othing more has been heard of it.

Source of Proposals a Mystery

Many people have been wondering just where these various proposals for limiting truck operations have come, and there are almost as many answers as there are questions.

Most widely held belief is that the railroads fostered the 250 mile limit proposal as it appeared in ODT, but there are other people, familiar with truck operations, who do not subscribe to this belief for the reason that railroads have all the traffic they can handle now and would be cutting their own throats to cause any restrictions on trucks.

Another version is that the 250 mile actually was spawned by some truck operators who took the proposal to ODT feeling that trucks would have more to gain by a 250 or 300 mile limit because what they would lose in the way of over 300 mile hauls would be offset by gains in shorter hauls. A well informed source who is close to motor transportation said, however, that this version is not true.

ODT May Hike Limit On Truck Speed

NPN News Bureau

WASHINGTON—Insistent claims by truck operators and others that the 35 m.p.h. speed limit is more bad than good has forced serious consideration by ODT of the feasibility of raising the speed ceiling.

ODT's study is being carried on by the division of review and special studies which was created when the transport conservation division was abolished (*NPN. Jan.* 13, *p.* 31) Head of the Division is Charles Dearing, formerly of the Brookings Institution.

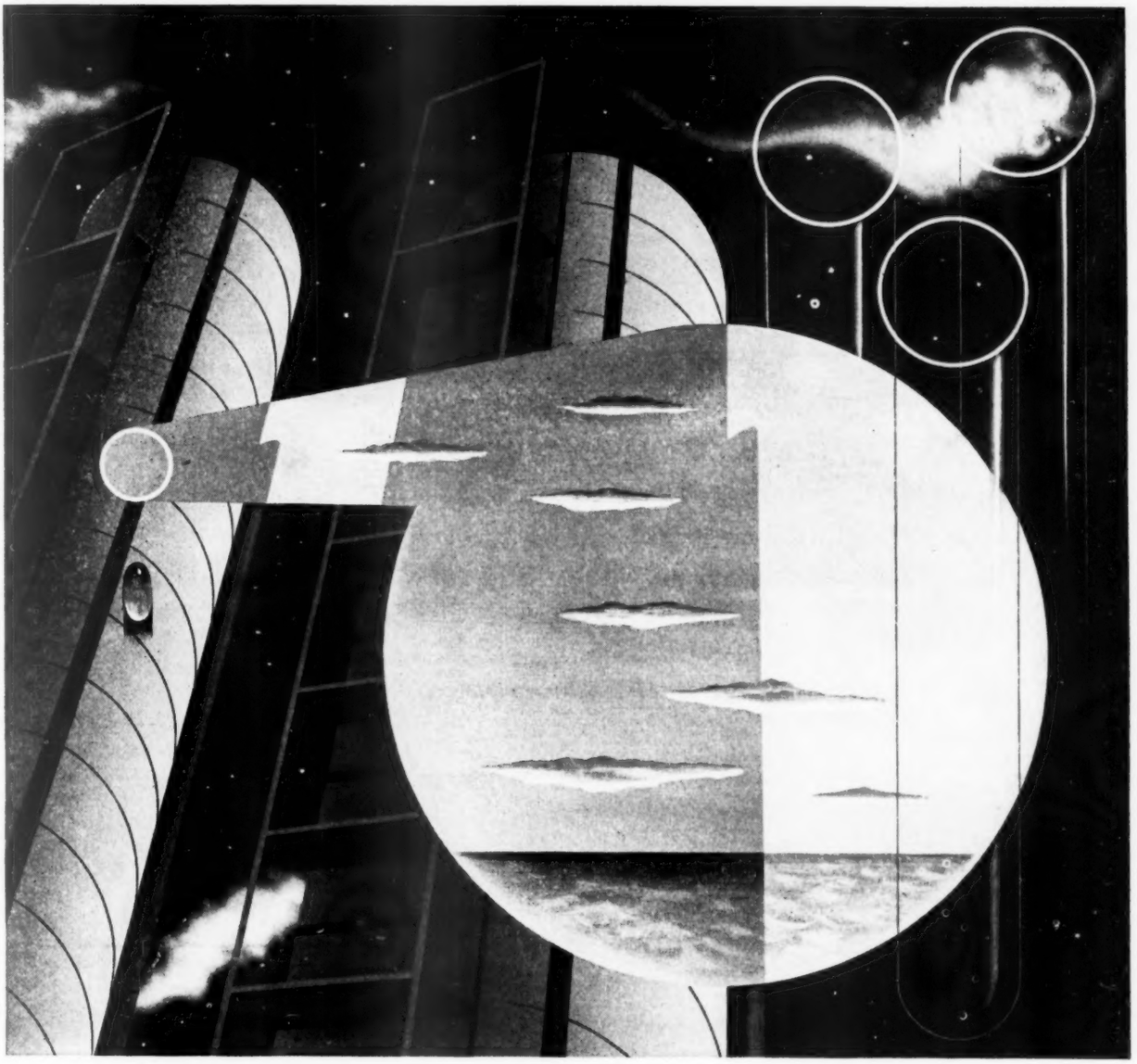
First official revelation that ODT is working on a higher speed limit came from ODT Eastman, speaking before the Council of State Governments in Baltimore on Jan. 26.

Forty miles per hour is being talked of as the alternative to the 35 m.p.h. limit, but informed quarters do not believe a decision will be made for at least a month on what the higher speed limit will be if it is approved at all.

When the 35-mile limit was first applied last fall, ODT promised that it would make a study later to ascertain the effect and implied that remedial steps would be taken if necessary.

Most frequent complaint of motor operators has been that 35 m.p.h. was a greater waste of rubber and fuel than even 40 m.p.h.

American Trucking Assn. has estimated



It's already Day after Tomorrow!

Under the stinging lash of a war for survival, American chemists are fighting fantastic battles . . . cramming a year's progress into a day . . . drawing up, in advance, the pattern of things to be.

For this is the new, stupendous era of synthetics. Already scientists are talking about glass that will float, wood that won't burn, window screens without wire, machinery bearings without metal.

Badger—with its engineers, chemists, draftsmen, designers, construction workers—is helping in this effort to save America now, to enrich her later on.

Among its many war jobs, Badger is building plants and equipment for the manufacture of butadiene and other materials required to make artificial rubber. It is building plants for producing acetic acid and phthalic anhydride used in the manufacture of plastics for airplanes. It is building T.N.T. plants, erecting huge refineries for the production of high-octane aviation gasoline.

Miracles are being performed in the petro-chemical industries today. For obvious reasons, they can't be talked about in detail. But they do send this message to every American: Win this war—and the dawn will break on a world more wonderful than you have ever known.

LICENSING AGENTS FOR THE HOUDRY CATALYTIC CRACKING PROCESSES

E. B. Badger & SONS CO., BOSTON · EST. 1841

NEW YORK · PHILADELPHIA · SAN FRANCISCO · LONDON

PROCESS ENGINEERS AND CONSTRUCTORS FOR THE PETRO-CHEMICAL INDUSTRIES

that 12% more vehicles and 18% more men will be required if carriers maintain their carrying capacity under the 35 m.p.h. speed limit.

The victory speed limit, so-called, has hurt tank truck operations, and it is known PAW has limited a report showing the effects to ODT.

Slower speed, informed sources say, calls for longer transit time—which means more drivers of which there is a shortage.

With the scarcity of spare parts already critical, truck operators insist the lower limit will mean greater wear and tear on parts, gears and brakes in particular.

The increase in tank truck operations from 50 to 70% of the time has been offset discouragingly by the 35 mile limit, it has been said.

Impression here is that the higher speed limit would affect all types of commercial vehicle operation, although the increase that has been actively supported in various government agencies for some time past has been for special emergency type shipments. Example is rush shipment by truck to export centers to catch departing ships.

Scott Warns Truckers On Need to Cut Empty Truck Miles

Special to NPN

DENVER — Government routing and dispatching of trucks is threatened by ODT unless the carriers cooperate better with the program for interchanging information on surplus traffic to reduce empty mileage.

This warning was voiced by Jack Garret Scott, ODT general counsel, in an address before the Colorado Motor Carriers Assn. here Jan. 30.

Mr. Scott said Joint Information Offices, serving as clearing houses where truck operators can obtain information on traffic they could carry back to their origin points, have been "noticeably bypassed and ignored".

"There has not been anywhere near complete registration of empty equipment and surplus traffic," he said. "There has been too much haggling about divisions of revenues. There has been too great a use of the corner filling station, and individual solicitation and shopping around.

'Must Not Continue'

"When vehicles have been leased, they have not been promptly loaded and unloaded and returned to the owner. These things cannot and must not continue.

"If they do, I think you should be warned that the Office of Defense Transportation may be forced by the necessities of the case to establish offices of its own to take over the matter not only of exchanging information but of routing and dispatching traffic."

Mr. Scott denied that ODT has drawn up a proposed order to limit truck hauls. He said "something" was put on paper by someone—he did not know by who—to serve as a basis of discussion for encouraging cooperation between railroads and trucks. The draft, widely circulated, had been described as a proposed ODT order.

Parts Untangled

Military-Civilian Tangle Over Parts Settled as WPB Grants AA-2X Rating To Aid Civilian Cars, Trucks, Buses

NPN News Bureau

WASHINGTON—Civilian orders for automotive replacement parts, which have been suffering at the hands of military orders bearing preference ratings, are being given a better break by WPB through the automatic granting of a high priority rating.

An automatic rating of AA-2X is placed on all civilian orders while all orders for Army, Navy and Maritime Commission have been invalidated unless they bear an AA-1 or better rating. AA-2X is close to the top of the priority list, while the AA-1 floor for military orders means they must be of the utmost necessity before manufacturers can fill them.

Didn't Use Ratings

In the past, civilian orders—which reached manufacturers through distributors and dealers after they sold parts to vehicle owners—have not borne preference ratings because the purchaser did not need a rating to buy the parts.

As a result, WPB explained, the civilian orders came without a tag giving it preference while the manufacturer also received Army, Navy and Maritime Commission orders which carried ratings. Upshot was diversion of parts, originally made for civilian use, to Army, Navy, and Maritime.

An amendment of Limitation Order L-158 "will correct this situation by authorizing producers and distributors to deliver replacement parts without regard to ratings on purchase orders bearing preference ratings of AA-3 or lower," WPB said. The amendment was issued Jan. 25.

Lists Parts Affected

The following replacement parts are affected by the order:

1—For all vehicles: component parts of engines; clutches; transmissions; propeller shafts; universal joints; axles; braking systems; wheels; tire valve assemblies; starting apparatus; frame and spring suspension assemblies; shock absorbers; speedometers; driving mirrors; windshield wiper assemblies; steering apparatus; exhaust systems; cooling systems; fuel systems; lubricating systems; electrical systems, including generators, motors, lights, reflectors and signal horns; windshield safety glass.

2.—In addition, but only for medium and heavy trucks, truck-tractors, truck-trailers, passenger carriers and off-the-highway motor vehicles: power dividers and take offs; transfer cases; fuses and flares; directional signals; coupling devices; trailer landing gears; seats; front fenders (only that type which support built in lighting), defroster heaters; truck refrigeration units; liquid measuring gauges.

3—In addition, but only for passenger carriers: body structural repair parts; sash; destination signs; fare boxes; guards and grab rails; door operating mechanisms; doors and door hardware; signaling devices; heating and ventilating equipment.

4—And cab assemblies in connection with truck-body conversions.

Truckers Get 101,246 Vehicles

NPN News Bureau

WASHINGTON—A total of 101,246 vehicles of all types have been released since the truck rationing program became effective March 9, 1942, WPB's automotive division has announced. This total includes 22,586 light, 53,883 medium, and 12,389 heavy trucks; 7235 trailers, and 5153 miscellaneous vehicles.

Maritime Contracts for 39 Tugs, All to be Made of Wood

NPN News Bureau

WASHINGTON — Contracts for the construction of 35 wooden tugs have been awarded to 7 companies located on the Great Lakes, East, West, and Gulf Coast, U. S. Maritime Commission announced Jan. 27.

The vessels, to be built in connection with the commission's barge program, are 65 ft. long and the first of their type to be ordered by the U. S. M. C., an announcement said. Price per tug will range from $31,500 to $41,032.

° ° °

WASHINGTON—Contract for construction of 4 wooden tugs has been awarded Arthur G. Blair, Inc., Yonkers, N. Y., Maritime Commission announced Feb. 1. The vessels, being constructed in connection with the commission's barge program, are to be 65 ft. long, of V2-M-AL1 design and similar to the 35 wooden tugs for which contracts have already been awarded. Price per tug has been set at $41,-032, commission said.

South Dakota Considers Relaxation Of Rules Governing Trucks

Special to NPN

PIERRE, S. D. — Three bills have been introduced in the state legislature to put truck transports on a wartime reciprocal basis with neighboring states, according to South Dakota Independent Oil Men's Assn.

One bill calls for waiving truck license and compensation fees of non-residents from other states granting same privileges. Second bill amends truck weights and length specifications to increase loads. Third bill would make it unnecessary for privately owned tank trucks hauling more than 1500 gal. to obtain Public Utilities Commission permits.

Sohio Completes New Towboat For Mississippi Service

NPN News Bureau

CLEVELAND — A new towboat, the "Sohioan", will go into service soon for Standard Oil Co. of Ohio, the company announces. Built for service on the Mississippi, the boat has a rating of 2400 h.p. and is equipped with Diesel engines which will use crude oil for fuel.

The boat will be officially christened the "Sohioan" by Miss Margaret Holliday, daughter of Company President W. T. Holliday, before active service early in February.

The vessel is air-conditioned throughout except for the engine room and, through the use of deep-freeze equipment and cold storage facilities, enough food can be carried to supply a full crew for 30 days.

The "Sohioan" is welded throughout, is 160 ft. long, has a 38 ft. beam and draws 6.5 ft. of water. This towboat will handle from 10 to 12 barges, each loaded with 9000 bbls. of oil.

"Don't they make Tri-Sure Closures for mouths?"

"IF I thought it would work, I'd take a closure off one of my drums of high octane gas.

"I'll tell you one thing, though — I wouldn't want that drum to travel as far as across the street minus one of those little sentinels. Especially nowadays.

"I know what I'm getting when I see a drum come in with Tri-Sure Closures doing guard duty on the lid. Those Tri-Sure seals are a swell sight to any man who has to count on getting every drop of oil, or gas, or chemicals he needs — and who has to be sure the stuff hasn't met up with sabotage or leakage or pilferage on the way.

"These days a drum without Tri-Sure Closures is about as complete as a safe without a lock. Ask any supply man. Ask any flyer. In fact, ask Uncle Sam!"

Tri-Sure
Reg. U. S. Pat. Off.
CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK

ODT Promotes Trailer Sales

Amortization of Cost of 892 Tank Semi-Trailers Which WPB Ordered Manufactured Is Allowed as ODT Acts To Get Units Into Oil Service

NPN News Bureau

WASHINGTON—Oil companies purchasing the 892 tank semi-trailers being manufactured under special WPB order for petroleum transportation will be allowed to amortize the cost by writing it off against profits in filing tax returns, according to ODT.

ODT Director Eastman announced that applications for more than 320 of the trailers already have been approved by ODT under commercial vehicle rationing mechanisms, and indicated most of the new units would be in the hands of operators within 2 months.

"At the same time," said the ODT announcement, "the ODT director announced the War Department had agreed that purchasers of the new semi-trailers would be eligible for Certificates of Necessity allowing them to amortize their investments in the units over either a 5 year period or the period elapsing between the purchase and the end of the war emergency."

To Protect Investments

"The plan is designed to protect operators on their investment in equipment which is essential to the war program and which the operators would not buy under normal circumstances. Under the provisions, operators will not have to extend amortization over a 5 year period if the war emergency ends sooner, but will be allowed to depreciate their investments in the war-essential units against the earnings which accrued during the period between their purchases and the end of the emergency."

An ODT spokesman explained the amortization feature applied to write-offs against Federal taxes.

Principal value of the semi-trailers, Mr. Eastman emphasized, will be in adding to the 14,000 tank cars already replaced by trucks and made available for long hauls.

Operators who want a trailer, he pointed out, should apply to ODT local allocations officers who are located in 80 cities across the country.

How to Apply

If the field officer approves the application, it is sent to ODT's motor transport division here for approval. Approved applications are given a Certificate of Transfer by WPB, authorizing them to purchase the semi-trailers or tractors.

ODT said recent studies indicated few additional tank cars could be diverted from short to long hauls unless more tank trucks were available, which was the basis for WPB orders calling for completion of about 892 semi-trailers by mid-February.

As indicative of how the need for additional trailers is distributed over the country, ODT made public the following break-down of 265 applications—not necessarily approved yet—received during the last 2 weeks:

Alabama, 4; Arkansas, 1; California, 7; Colorado, 1; Florida, 18; Georgia, 3; Illinois, 83; Indiana, 2; Iowa, 10; Kentucky, 2; Maine, 3; Maryland, 2; Massachusetts, 12; Michigan, 9; Minnesota, 3; Missouri, 5; Nebraska, 7; New Hampshire, 1; New Jersey, 5; New York, 14; North Carolina, 9; North Dakota, 3; Ohio, 5. Oklahoma, 22; Pennsylvania, 5; Rhode Island, 2; South Dakota, 1; Texas, 4; Vermont, 2; Virginia, 18; West Virginia, 1; Wisconsin, 20, and Wyoming, 1.

Spokesman said breakdown is not available yet for all 320 approved applications.

Trucks To Replace Tank Cars On Wisconsin Shipments

NPN News Bureau

CHICAGO — Interstate Commerce Commission has authorized 10 truckers to transport petroleum products into 17 counties in southwestern Wisconsin, Frank Purse, district director of the ICC bureau of motor carriers, announced Jan. 27.

The area had been served by tank cars and lake transportation.

Authorizations provided deliveries must be made from the Chicago area or from Lemont, Lockport or Layton townships in Illinois.

"It is estimated by the ICC that 200 railroad tank cars can be released for transportation of fuel oil to the East Coast by this authorization," Mr. Purse said.

Under the new plan, barges will replace transportation by truck when the icebound water terminals open for lake transportation.

The 10 trucking companies receiving ICC authorizations are: Barry Transfer and Storage, Milwaukee; Stefke Freight Co., Wausau, Wis., Olson Transportation Co., Green Bay, Wis., Petroleum Transportation Co., Madison, Wis.; Felt-Davis, Inc., Hammond, Ind.; Refiners' Transfer and Terminal Corp., Detroit; James A. Hannah, Inc., Chicago; Rogers Cartage Co., Chicago; and Willett Co., Chicago.

Two Non-Rotation Victims

These 4 tires made completely of reclaim rubber were mounted on the same automobile at the same time and were never driven over 35 m.p.h. during road tests conducted by B. F. Goodrich. The 2 tires on the right were used on the rear wheels and were never rotated. They show excess tread wear which could have been avoided by correct rotation

Diesel Trucks, Others Exempt From Retail Credit Ban

NPN News Bureau

WASHINGTON — Privilege of using credit cards at service stations or of buying motor fuel at stations operating 24 hours a day was extended by PAW today to commercial vehicles powered by butane or Diesel fuels.

In addition to vehicles displaying "T" gasoline rations stickers, service stations may honor credit cards presented by vehicles which have only an ODT Certificate of War Necessity which is issued to all commercial vehicles regardless of what they use for fuel. The extension was made by Amendment 1 to Petroleum Directive 62.

Name Priorities Committee For Transport Industry

NPN News Bureau

WASHINGTON—A special committee to handle priorities for materials and equipment requirements of the transportation industry was formed by WPB Feb. 1.

Chairman of the committee is W. W. Judson, general manager of Northern Pacific Railway, who is a $1-a-year man with WPB where he is director of the public services division of the program bureau.

Vice-chairman is Dr. W. Y. Elliott, director of stockpiling and transportation division of WPB.

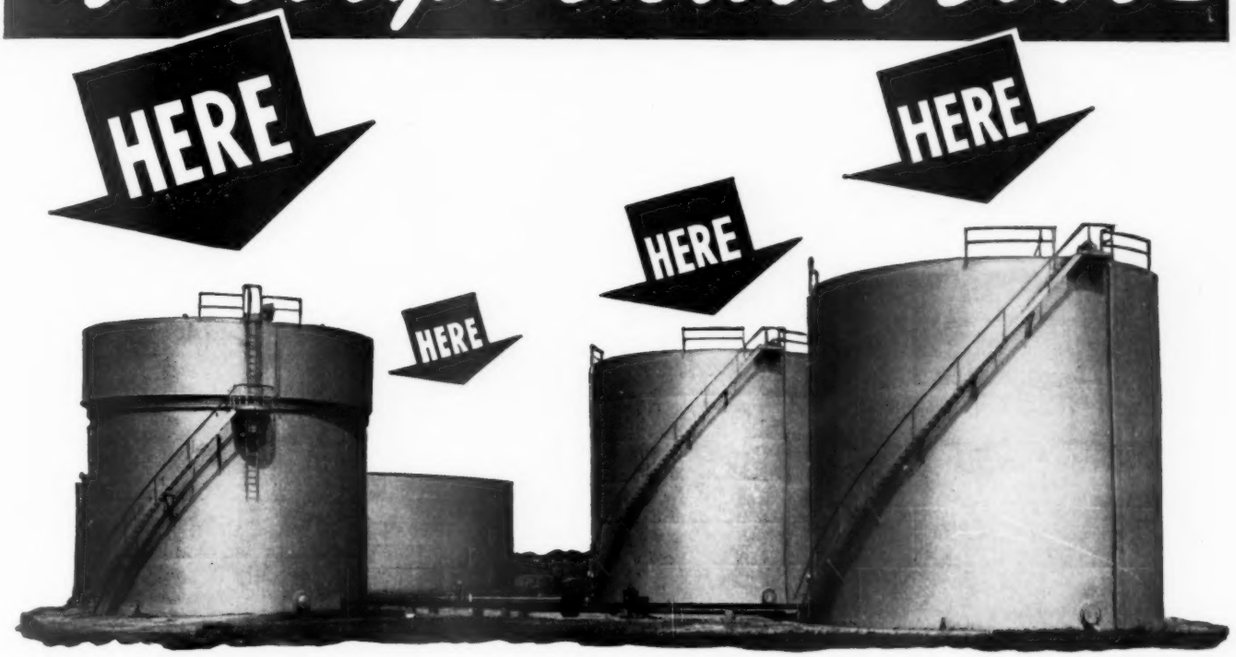
WPB said the committee would be composed of representatives of PAW, ODT, War Department, Navy, Maritime, Office of Civilian Supply, WPB transportation equipment division, WPB division of stockpiling and transportation, public services division of program bureau, and WPB automotive division.

To Give CWN Appellors 'Gas'

NPN News Bureau

WASHINGTON—Operators of commercial vehicles who are dissatisfied with the gallonage allowance on their Certificate to War Necessity may file an appeal and, upon receiving a postcard notification by ODT that the appeal is under consideration, may be given a temporary transport ration to carry them through Mar. 31, ODT announced Feb. 1.

No Evaporation Loss—



They're all protected by ONE

GRAVER EXPANSION ROOF

Four storage tanks—three of them cone roofed and manifolded to the fourth which is equipped with a Graver Expansion Roof. As the vapors expand or contract the Expansion Roof rises or falls. No vapors are expelled for there is always ample space regardless of temperature or weather conditions.

Here's efficiency—and economy. Only one Expansion Roof required to protect the whole battery of tanks. Furthermore, a Graver Expansion Roof tank requires no more maintenance than an ordinary cone roof tank and will last even longer. Its conical roof is self-draining. All equalizing mechanism is inside, protected from the weather, yet it can be adjusted from outside without taking the tank out of service.

Get the facts. Find out how Graver Expansion Roofs are saving thousands of gallons of high octane gas for major oil companies all over the country. Write Graver—today.

STEEL STORAGE TANKS
•
VAPOR CONSERVATION SYSTEMS
•
WELDED CONSTRUCTION
•
STRESS RELIEVING
•
X-RAYING
•
FABRICATED STEEL AND CORROSION-RESISTING PLATE
•
WATER SOFTENERS
•
FILTRATION SYSTEMS
•
CLARIFIERS
•
SEWAGE EQUIPMENT

GRAVER

GRAVER TANK & MFG. CO., INC.

NEW YORK
CATASAUQUA, PA.

4811-17 Tod Ave.
EAST CHICAGO, IND.
CABLE ADDRESS — GRATANK

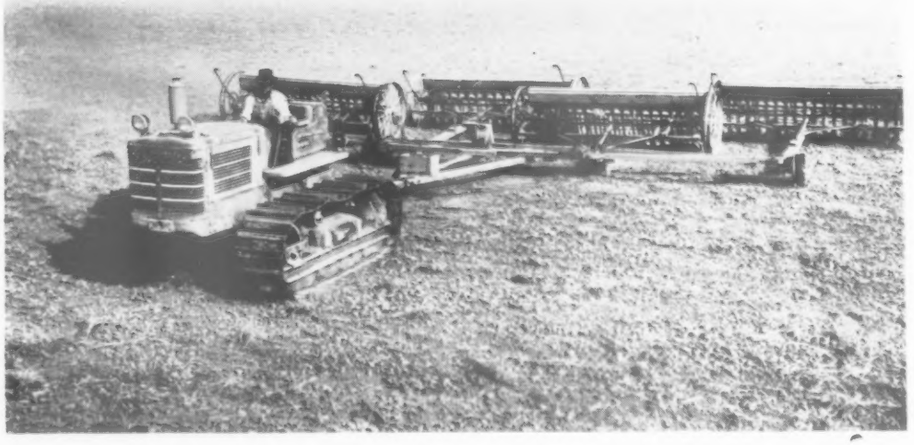
CHICAGO
TULSA

3-1-S

Thirty per cent of the farm machinery manufactured in 1940, instead of 23% as originally set by the War Production Board, will be turned out in 1943 as a result of new WPB action. This will help some to meet the 1943 "Food for Freedom" goals. But the severe cut from 1940 output throws more load on older equipment; means farmers will have to use it to the maximum, keep it properly lubricated and in good repair

WPB Increases Farm Machinery Quota for 1943

Prodded by Secretary Wickard and the Senate's Truman Committee, WPB Is Permitting an Increase in Implement Output



New action by WPB to increase farm machinery production in 1943 will mean the manufacture of about 37,000 additional tractors, according to the U. S. Department of Agriculture. Farm machinery output in 1943 has been set by WPB at 30% of the amount manufactured in 1940 and the output of repair parts at 160% of the 1940 figure

NPN News Bureau

WASHINGTON—New farm machinery and additional repair parts for 1943 have been substantially increased through action of the War Production Board to help farmers meet the "Food for Freedom" goals set by the U. S. Department of Agriculture.

Farm machinery manufacturing quota was increased by the WPB on the insistence of Agriculture Secretary Wickard and the Truman committee of the Senate.

Secretary Wickard's drive for more farm machinery and repair parts will continue until at least the original increase urged by the Department of Agriculture is approved.

A farm market for oil, greater than at any previous time, will result from this increased use of farm machinery.

'Must Make Equipment Last Longer'

"For months I have been hammering on the great need for farm machinery and other materials of production," said Secretary Wickard. "I have tried as hard as I can to get more essential materials for agriculture. I am going to keep on trying. But whatever happens, there is no chance that we will get as much as we need. We must make machinery and materials last longer and do more."

That means that machinery on the farms should be repaired, brightened up, lubricated and made ready for spring work.

U. S. Department of Agriculture originally recommended to WPB that steel be allocated for the manufacture of 38% of the 1940 output of farm machinery. The department also recommended that provision be made for manufacture of 167% of the repair parts made in 1940.

WPB fixed the percentage of new farm machinery for 1943 at 23% of the 1940 output.

After the Truman investigating committee made its report, WPB last week on Jan. 21 increased the percentage from 23 to 30% of the 1940 farm machinery manufactured and sold for use on farms.

Total value of farm machinery, including repair parts, manufactured and sold in 1940 was $488,321,000. Of this amount, $65,000,000 was for repair parts. Thus percentages are figured in $423,327,000. Thirty percent of that amount is $126,998,000, so this provided the percentage is not changed, will be the limit of farm equipment to be made in 1943 for farm use.

WPB on Jan. 27 increased the quota for repair parts from its original 130% of the 1940 output to 160%. The output in 1940 was $65,000,000; therefore, repair parts for 1943 will be made in the amount of $104,000,000.

WPB Urges Care of Equipment

In announcing the changed percentage for repair parts, WPB stated:

"The change is the result of WPB's deter-

mination that adequate supplies of repair parts be made available to farmers in 1943, particularly since the production of new machinery has been drastically curtailed. It is expected that every machine on a farm that can be used to advantage will be repaired and put into good working condition."

"So even WPB expects the farmers to get into immediate action in placing farm machinery in proper shape.

WPB allotted 50,000 tons of Bessemer steel for farm machinery.

On Jan. 1, 1943, there were approximately 1,900,000 tractors on farms. The new quota, it is figured by the agriculture department, will mean at least 37,000 additional tractors during 1943. Rubber constitutes a problem. Tractors with rubber tires last longer, since there is less vibration, and generally are more efficient, but scarcity of rubber and demand for it for war purposes will require that the tractors made in 1943 be equipped with steel tires.

On Jan. 1 there were 260,000 combines on farms of the U. S. The calculation thus far calls for about 17,000 additional combines. It is plain that the percentages of the 1940 production will vary with the different types of farm machinery. One reason for the larger percentage for combines is that they will be needed in the soybean harvest.

Truman Sees 'Grave Danger' Ahead

WPB was spurred to action in increasing the percentages of farm machinery and repair parts for 1943 by the report of the Special Committee Investigating the National Defense Program, headed by Sen. Harry S. Truman, Mo. The report stated:

"America faces the grave danger of not reaching its food production goals for 1943 and 1944, instead of obtaining the increases required by wartime demands. The effect of the farm labor shortage has been intensified by the drastic limitation on production of farm machinery for 1943. Responsibility for this limitation rests squarely on the Office of Civilian Supply of the War Production Board."

Later in the report, the Truman committee says:

"Farm machinery and equipment are the machine tools which the former needs in order to produce his crops. Therefore, farm machinery and equipment must be provided in quantities great enough to permit the farmer to attain the food goals set for him."

In rejecting the recommendations for production of needed farm machinery, the Office of Civilian Supply has "gambled dangerously and unwisely with our Nation's food supply," the committee stated. Closing, the report says:

"The Committee therefore recommends that the new farm machinery program should be drafted with the views of those who have the responsibility for food production in the forefront, and not thrust out the back door, and that sufficient metal should be made available to produce the machinery and equipment which those charged with that responsibility deem essential to success in attaining the food goals we have set."

Fires Take Toll

More Than 25 Oil Industry Fires Occurred in Year After Pearl Harbor, Each Hampering War Effort, N.F.P.A. Report Says. $3 Million Damage Done

NPN News Bureau

CLEVELAND — Twenty-five petroleum industry fires, causing a loss in excess of $3,000,000 are listed in "Fires in One Year of War", a compilation by the National Fire Protection Assn. of fires in the first year since Pearl Harbor which have directly hampered the war effort.

The N.F.P.A. report covers the period Dec. 7, 1941-Dec. 7, 1942. The report is not intended as a complete list of all fires which have hampered the war effort during the period covered, N.F.P.A. says, "as there have doubtless been hundreds of others which have not been reported to the N.F.P.A."

The oil industry fires, as listed by N.F.P.A. follow:

December 8, 1941—Oil Tanker—Wilmington, N. C.
Careless smoking caused a fire which partially destroyed an oil tanker while it was being unloaded at a dock. One man was drowned escaping the flames.

January 5, 1942—Oil Terminal—Superior, Neb.
Ten gasoline storage tanks and a frame warehouse were totally destroyed by fire believed caused by static electricity. Flaming gasoline sprayed over the oil warehouse when gasoline tanks exploded. Loss estimated: $10,000.

January 13, 1942—Oil Barge—New Orleans, La.
Three tremendous explosions followed by fire wrecked an oil barge tied up at the dock of an iron works plant. Loss: $10,000.

January 14, 1942—Oil Property—Claymont, Del.
A Delaware River pier and a crude oil warehouse were destroyed by flames. Exploding oil drums fed the blaze. The fire apparently started from a spark from welding operations which were being carried on under the pier. Newspapers reported loss at $250,000; believed excessive.

January 18, 1942—Oil Storage Tanks—Sacramento, Calif.
Six 18,000-gallon oil and gasoline storage tanks were destroyed by fire apparently caused by a static spark. A biscuit warehouse and two freight cars were also gutted. Property was located outside the city limits and no private fire protection. Loss: $65,000.

January 22, 1942—Gasoline Storage Plant—near Reading, Pa.
Two gasoline storage tanks and an office building were destroyed by flames. Blaze started when mechanic fixing the battery of a gasoline tank truck struck a spark, igniting gasoline fumes. Alarm was delayed. Water supply was inadequate—nearest hydrant a mile away. Tanks were improperly vented and dikes were too small to control overflow. Employees neglected to operate safety valves at start of fire. Loss: $150,000 estimated.

January 29, 1942—Oil Distributing Plant—Lima, Ohio.
A driver was loading a tank truck with gasoline when a static spark ignited the fumes. Flames quickly involved the loading rack and seven oil and gasoline storage tanks. Fire burned itself out. Loss: $100,000.

February 22, 1942—Oil Tank Truck—North Hampton, N. H.
A driver was fatally burned when he lost control of his oil tank truck on a hill. Truck and 3,000 gallons of Diesel fuel oil for the Portsmouth Navy Yard were destroyed. Loss: $10,500.

February 25, 1942—Oil Barge—Vicksburg, Miss.
Small fire originated behind stored oil barrels near a wooden wall. Gasoline vapors quickly ignited and flames spread over the entire barge. The deck was saturated with gasoline and oil, and this contributed to the rapid spread of the flames. Loss: $5,000.

March 3, 1942—Oil Refinery—Port Arthur, Texas.
Twenty-five employees were injured when an explosion and fire damaged an oil refinery. Blast was believed to have resulted from packing blowing out on a hot oil pump.

March 6, 1942—Oil Barge—Houston, Texas.
Three workmen were killed when a barge exploded while being repaired. Sparks from welding caused the blast.

July 1, 1942—Oil Property—Taft, Calif.
Fire of undetermined origin completely destroyed a valve shop and a platform containing valves, regulators and fittings destined for use in a new high-octane gasoline plant. Oil-soaked timbers supporting the platform contributed to the rapid spread of the flames. No watchman service provided. No direct fire alarm service to fire department, so alarm had to be telephoned, causing slight delay. Loss: $150,000.

July 3, 1942—Oil Property—Harlan, Ky.
The over-filling of a gasoline storage tank resulted in a flash fire which took one life, destroyed the tanks and equipment of an oil broker and gutted three frame dwellings. The blaze occurred when a railroad tank car containing nearly 10,000 gallons of gasoline was being discharged into one of four storage tanks. The tank was allowed to overflow. The source of ignition is not known.

July 14, 1942—Oil Warehouse—Tuscaloosa, Ala.
Fire in a large warehouse containing lubricating oil and other petroleum products was first discovered by railroad guards on duty at a near-by trestle and by a watchman in another building. However, there was a 45-minute delay before an alarm was turned in because these men were afraid to leave their posts to find a telephone. The watchman in the burning warehouse was finally awakened by an oil drum explosion. Blaze was believed caused by careless smoking. Loss: $74,154.

July 18-19—Oil Property—Marysville, Calif.
Blaze originated in the loading racks destroyed four 10,000-gallon gasoline storage tanks, a 10,000-gallon stove oil tank and a 7,000-gallon fuel oil tank. Flames also destroyed an adjacent furniture warehouse. Loss: $72,400.

July 27, 1942—Oil Property—Tulsa, Okla.
Lack of proper precaution in filling a gasoline tank truck resulted in the destruction of a distributing station building and four storage tanks, together with the tank truck being filled. Cause of ignition was either a static spark or a spark from the engine exhaust. The truck motor was left running while operations were being performed. Loss: $10,000.

July 28, 1942—Oil Barge—Paducah, Ky.
Five men were killed by an explosion which demolished a fuel tank barge while the men were working to render the vessel gas-free. Cause of ignition is unreported.

July 28, 1942—Oil Warehouse—Ogden, Utah.
A large warehouse used for the storage of oils and greases was razed by fire of unreported origin. There were no fire walls or fire doors. Flames spread rapidly due to the explosions of gasoline storage tanks.

August 16, 1942—Oil Distributing Plant—Wilmington, Ohio.
Fire of undetermined origin reportedly damaged 18 tons of scrap rubber and threatened to ignite large gasoline tanks 50 feet away. Clouds of smoke rising from the blazing rubber hindered the firemen fighting the fire.

September 7, 1942—Oil Refinery—Texas City, Texas.
A terrific explosion shattered the main pumping plant of a refinery when fumes from a naphtha tank were carried by the wind into an open furnace. Two employees were fatally burned. Congested traffic conditions delayed the fire department. Loss: $750,000.

September 8, 1942—Oil Property—Glasgow, Mont.
Warehouse containing gasoline and oil was completely razed by fire which occurred when gasoline fumes exploded. Cause of ignition was undetermined. Loss: $12,500.

September 10, 1942—Oil Refinery—Enid, Okla.
Fire occurred in the vacuum still department when an oil tank overflowed. Plant manufactured aviation gasoline. The still, several tanks and furnaces, a water tower, three small buildings, and about 30,000 barrels of oil were destroyed. Tanks were badly spaced, improperly vented, not gas-tight, and not diked. Private fire appliances were inadequate. Plant was located outside city limits. Loss: $750,000.

September 26, 1942—Tank Vessel and Tug—Toledo, Ohio.
Two men were fatally burned when gasoline vapors at gauge holes of tanker were ignited by boiler fire of tug. Ballast from tanker pumped into water at slip spread fire to the tug and near-by barge. Inexperienced pumpman on duty failed to shut flow of gasoline into tanker, but ran mile to telephone to plant for instructions. No fire equipment at dock. Loss to vessels: $18,200.

October 18, 1942—Oil Storage Tanks—Fredericksburg, Va.
Thirteen storage tanks containing valuable high test gasoline and fuel oil were destroyed by fire which started while Fredericksburg was undergoing a severe flood. With the water system put out of commission by the flood, the city fire fighters were powerless to extinguish the blaze until chemical equipment arrived from Norfolk. Loss: $150,000.

October 27, 1942—Oil Refinery—Santa Maria, Calif.
Explosion and fire of unreported cause destroyed an oil refinery and 150,000 gallons of oil. Loss: $50,000.

WHAT FIRE-KILLER WOULD YOU PICK FOR FIGHTING A BLAZE IN...

HOT OIL?
AN ELECTRIC MOTOR?
RUBBISH?
CARBON BISULPHIDE?
GASOLINE?

Get the wrong answer and it costs plenty! Fire can gain headway too fast, if you hit it with the wrong extinguisher.

All fires aren't alike. Neither are fire extinguishers. Special fire hazards call for special fire-fighting equipment. How are *you* fixed?

There's one easy way to tell. Look at the Underwriters' Laboratories' approval notice on your extinguishers. It will say something like "Classification A-2, B-2." The letters "A," "B" or "C" are what you are looking for. They tell if the extinguisher is OK for use on Class "A" fires (wood, rubbish, paper, etc.), Class "B" fires (flammable liquids) or Class "C" fires (electrical).

This simple check tells you if you have the right extinguishers standing guard beside your plant's varied fire hazards.

Kidde carbon dioxide extinguishers are for flammable liquid (Class "B") and for electrical (Class "C") fires. They snuff these blazes fast, smother them in a blasting cloud of snow-and-gas. Kidde carbon dioxide gas is one of the fastest known extinguishing agents.

Walter Kidde & Company, Inc.,
229 West Street, Bloomfield, N. J.

Kidde
HIGH PRESSURE GASES · FIRE PROTECTION
PROTECTS LIVES

Sees Better Future for Oil Jobber; Buys Seneca Oil Company

CLEVELAND—There are still opportunities for oil jobbers, L. H. Alexander, with 28 years of oil experience back of him, believes. He recently backed this belief by announcing the acquisition of the Seneca Oil Co., Fostoria, Ohio.

This independent oil jobbing business has been operated since 1935 by James R. McElroy, a director of Ohio Petroleum Marketers Assn., who will devote all his time to the operation of his farm near Fostoria.

"Regardless of the many 'cock-eyed' and unnecessary handicaps oil jobbers face today," Mr. Alexander tells NPN, "there is still an opportunity for oil jobbers to carry on with prospects for a better future as the smoke clears away."

Mr. Alexander's experience has all been in the marketing end of the business. He was formerly with Ohio Standard and the Solar Refining Co. For the past 5 years he has been district representative of Fleet-Wing Corp. Prior to that he managed the Pearl Oil Co. at Bowling Green, Ohio.

Indiana Standard's General Office Honors Employes in Armed Forces

NPN News Bureau

CHICAGO—Honor roll of 94 general office employes of Indiana Standard now in the armed forces was unveiled at ceremonies attended by other company employes in the lobby of the Standard Oil building here Dec. 30.

Total employes of the company now in the service number 1750, including office, field and other departments.

Amos Ball, vice-president in charge of sales, presented the honor roll of office employes on behalf of the company. It was accepted by A. V. Skwieroz, president of the Standard Oil Employes Assn. of the general office, who acted as representative of all employes.

We Must Win the War in '43

While waiting in a government office for an interview with a fourth assistant comma-checker-upper, this startling discovery was made by one of NPN's oil men friends:

	Hitler	Mussolini	Stalin	Churchill	FDR
Born	1889	1878	1876	1874	1882
Came into power	1933	1922	1924	1940	1932
Age	54	65	67	69	61
Years in power	10	21	19	3	11
Total	3886	3886	3886	3886	3886
Divide by 2	1943	1943	1943	1943	1943

Which means, says our mathematically-minded friend, that we must win the war in 1943.

(*If you haven't figured it out yet, turn to p. 40 for the answer*).

1942 Financial Reports

Atlantic Refining

PHILADELPHIA — A profit of $6,800,000 for 1942, compared with $14,348,000 for 1941, is reported by Atlantic Refining Co. The 1942 figures include a non-operating income item of $3,274,000 from involuntary conversion of fixed assets and a deduction of $2,000,000 for a reserve for wartime and post war contingencies, the company said. After provision for dividends on preferred stock, Atlantic's profit per share on common stock was $2.33 for 1942 compared with $5.16 for 1941.

° ° °

Tide Water Associated

NEW YORK — Tentative net earnings, after deduction for operating charges, estimated federal taxes, a reserve of $280,000 for possible decline in inventory values and a $1,250,000 reserve for wartime uncertainties, amounted to $10,447,500 in 1942 compared with $15,564,000 in 1941, the company reports. Tentative net income for 1942 was equivalent to $1.28 per common share as against $2.09 in 1941.

° ° °

Bureau of Mines Produces Movie On First Aid Practices

NPN News Bureau

WASHINGTON—Bureau of Mines announces production of new sound motion picture film entitled "First Steps in First Aid".

Running time for the film is 31 minutes. Copies are available for exhibition by industrial and civil defense training classes, training courses conducted by or on behalf of the Army, Navy, and Maritime Service, and for showings by schools, churches, colleges, and other similar groups. The film is 16 millimeter.

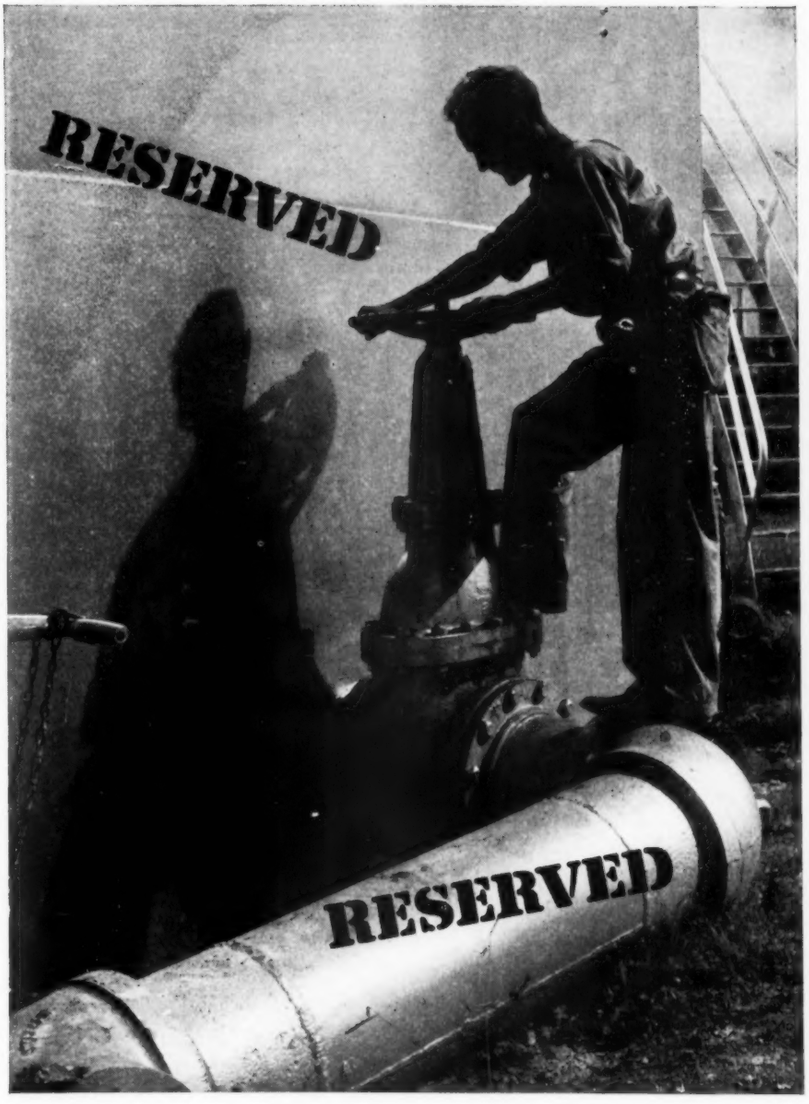
Application for free loan of the film should be addressed to the Motion Picture Section, Bureau of Mines, Central Experiment Station, 4800 Forbes St., Pittsburgh, Pa., and should state specifically what equipment the borrower has for showing sound films. No charge is made for use of the film but the borrower is expected to pay transportation charges and for loss or damage other than normal wear.

* * *

Shell Honors Men in Service

NPN News Bureau

CLEVELAND—Shell Oil's Cleveland division office is sporting a new service flag recently received from headquarters. Those who take the trouble to count them will find 4090 stars on the decoration, representing approximately 1 out of 4 of Shell's payroll who are busy eliminating the ax from the axis.



. . . for your product *exclusively*

At every General American Terminal your commodity flows through a separate line—with a separate pump—into a separate storage zone from that used for any dissimilar commodity. In addition, you get the protection of trained personnel to speed the handling of your shipments—an especially vital consideration in war-times. General American Terminals are strategically located for your economy.

GATX GENERAL AMERICAN

A SYMBOL OF INTEGRITY FOR OVER 40 YEARS

GENERAL AMERICAN TANK STORAGE TERMINALS

Goodhope and Westwego, La. (*Port of New Orleans*)
Carteret, N. J. (*Port of New York*)
Corpus Christi, Texas
Galena Park, Texas (*Port of Houston*)

A Division of General American Transportation Corporation

10 Ways to Make Your ROTARY PUMPS Last Longer!

THIS SERVICE CARD "CHECK LIST"
IS FREE
TO ALL BULK PLANT OPERATORS AND OTHER USERS OF PUMPS IN THE OIL INDUSTRY

Hang one near each pump. Insist that it be followed.

HELP CONSERVE PRESENT PUMPS.

Send for these New Blackmer Bulletins

They are FREE to pump users.

No. 301—"FACTS about ROTARY PUMPS" Structural data and diagrams Bucket Design (swinging vane) pumps.

No. 302—PUMP ENGINEERING DATA. Usable data on pumps and piping.

CLIP and MAIL THE COUPON NOW.

THE PUMP THAT IS SELF-ADJUSTING FOR WEAR
FAMOUS BUCKET DESIGN

BLACKMER
· ROTARY ·
PUMPS

POWER PUMPS
5 to 700 GPM.
TRUCK PUMPS
50 - 100 GPM.
HAND PUMPS
54 models.

"Serving the petroleum industry for 40 years"

To BLACKMER PUMP COMPANY,
1882 Century Ave., S.W., Grand Rapids, Mich.

Please send us:

_____Copies No. SER-1 Cards ..... ☐
_____Copies No. 130 Blackmer General Catalog.. ☐
_____Copies No. 301 Facts About Rotary Pumps.. ☐
_____Copies No. 302 Pump Engineering Data.... ☐

Name .....

Company .....

Address .....

THERE WILL ALWAYS BE A MARKET FOR AN OIL LIKE *THIS*. As motoring becomes more and more a luxury and motorists take better care of their cars, the demand for high grade motor oils will grow by leaps and bounds. Take advantage of this situation by offering them one of the famous FREEDOM brands of 100% Pure Pennsylvania motor oils: Fort Pitt, Four-State, Penn Trump, or Beaver-Penn. Write today for exclusive territory.

FREEDOM OIL COMPANY — FREEDOM, PENNSYLVANIA

PACIFIC COAST BULK PLANT AND WAREHOUSE: LOS ANGELES, CALIF.

COMING MEETINGS

FEBRUARY

Eastern States Gasoline Dealers Conference, Wilmington, Del., Sun., Feb. 14.
American Institute of Mining and Metallurgical Engineers, Annual Meeting, Engineering Societies Bldg., 29 W. 39 St., New York City, Sun.-Thurs., Feb. 14-18.
American Institute of Mining & Metallurgical Engineers, Annual Meeting, New York, N. Y., Mon.-Thurs., Feb. 15-18.
Illinois Petroleum Marketers Assn., 1943 Victory Convention, Hotel Pere Marquette, Peoria, Ill., Wed.-Thurs., Feb. 17-18.
Iowa Independent Oil Jobbers' Assn., Hotel Fort Des Moines, Des Moines, Ia., Wed.-Fri., Feb. 24-26.
North Texas Oil & Gas Assn., Annual Meeting, Woman's Forum, Wichita Falls, Texas, Sat., Feb. 27.

MARCH

Oil-Heat Institute of American, Inc., Twentieth Annual, Hotel Commodore, New York City, Mon.-Tues., March 8-9.
Indiana Independent Petroleum Assn., Inc., Semi-annual Convention, Hotel Severin, Indianapolis, Ind., Tues.-Wed., March 10-11.
Empire State Petroleum Assn., Inc., Annual Meeting, Syracuse, N. Y., Thurs., March 11.

APRIL

New Jersey Oil Trade Assn., Inc., Annual Spring Frolic, Robert Treat Hotel, Newark, N. J., Thurs., April 1.
American Assn. of Petroleum Geologists 28th Annual Meeting, The Hotel Texas, Fort Worth, Texas, Tues.-Wed.-Thurs., April 7-8-9.
American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pa., April 8-9.
American Chemical Society, Petroleum Division, Detroit, Mich., Mon.-Fri., April 12-16.
Natural Gasoline Association of America, Baker Hotel, Dallas, Texas, Wed.-Fri., April 14-16.
The American Society of Mechanical Engineers, Hotel Blackhawk, Davenport, Iowa, Fri.-Sun., April 26-27-28.

MAY

Petroleum Industry Electrical Assn., Rice Hotel, Houston, Texas, Wed.-Thurs., May 5-6.
National Fire Protection Assn., Palmer House, Chicago, Ill., Mon.-Sat., May 10-11-12-13-14-15.

JUNE

The American Society of Mechanical Engineers, Hotel Biltmore, Los Angeles, Calif., Mon.-Wed., June 14-15-16.
New Jersey Oil Trade Assn., Inc., Spring Golf Outing, Suburban Golf Club, Elizabeth, N. J., Thurs., June 24.

OCTOBER

West Virginia Petroleum Assn., Annual Convention, Daniel Boone Hotel, Charleston, W. Va., Wed., Oct. 13.
Petroleum Division, National Assn. of Credit Men, St. Louis, Mo., Mon.-Wed., Oct. 25-26-27.

NOVEMBER

The American Society of Mechanical Engineers, New York, Mon.-Fri., Nov. 29-30, Dec. 1-2-3.

DECEMBER

Nebraska Petroleum Marketers, Inc., Fontenelle Hotel, Omaha, Tues.-Thurs., Dec. 7-8-9.

Why We Must Win in '43

(*Answered from p.* 38)

It's all a hoax. By adding the date of birth to the age, the answer equals the current year. By adding any arbitrary date to the number of years between that date and the current year, the answer is, of course, the current year. In the table, all figures have been added together, which gives a number equal to twice the current year. Divide by 2 and—*presto!* But, seriously, this really is the year to win the war—Ed.

NPN's WASHINGTON DIRECTORY of Oil Agency Headquarters

Following is a partial list and directory of governmental agencies in Washington dealing with matters affecting the oil industry. (List is as accurate as possible but is only tentative as room and phone numbers are constantly changing.)
Abbreviations code: Rm for room; Ex for phone extension.

Office of Petroleum Administration for War

New Interior Building, 18th and C Sts., N. W., Phone REpublic 1820.

Receptionist
Mrs. **Rosalie E. Reid,** Rm 6635, Ex 3429-4820.

Administrator
Harold L. Ickes, Rm 600, Ex 5000.

Deputy Petroleum Administrator
Ralph K. Davies, Rm 6654, Ex 3831.
Bernice Kirschling, personal assistant to Davies, Rm 6654, Ex 3831.
H. Chandler Ide, assistant to Davies, Rm 6654, Ex 3833.

Special Assistants
Joseph A. Fanelli, Rm 126, Ex 761.
Dr. John W. Frey, Rm 7424, Ex 4272.
Howard T. Mather, Rm 4418, Ex 4626.
J. Elmer Thomas, Rm 6622, Ex 4735.

Assistant Deputy Petroleum Administrators
Robert E. Allen, Rm 6637, Ex 4401.
Elmer E. Batzel, special assistant to Allen, Rm 6520, Ex 2181.
Earl J. Opal, chief of review and clearance section, Ex 2156.
Bruce K. Brown, Rm 6623, Ex 2066.
Everett Lee DeGolyer, Rm 6631, Ex 4459.
Eric L. Kohler, executive officer, Rm 6644, Ex 3822.
E. J. Skidmore, special assistant to executive officer, Rm 6415, Ex 4363.
Glen D. Thompson, assistant, Rm 6412, Ex 4634.

Information Division
Gordon Sessions, director, Rm 7515, Ex 3161.
Herbert A. Yocom, assistant director, Rm 7515, Ex 3181.

Division of Reserves
William B. Heroy, director, Rm 7516, Ex 4454.

Facility Security Division
W. D. Mason, director, Rm 5213, Ex 4172.

Foreign Division
James T. Duce, director, Rm 4212, Ex 4417.
William D. Crampton, associate director, Rm 4209, Ex 4788.
C. Stribling Snodgrass, associate director, Rm 4218, Ex 2968.
A. H. Chapman, assistant to director, Rm 4214, Ex 2655.
Lester H. Nuland, assistant to director, Rm 4215, Ex 2534.
Grover Rees, special legal assistant, Rm 4227, Ex 2568.
Howard L. Freeman, foreign materials specialist, Rm 4023, Ex 4461.
J. F. Griffis, foreign requirements analyst, Rm 4226, Ex 2789.
H. A. Hassan, Lend-Lease specialist, Rm 4226, Ex 2921.
L. A. Mckler, Russian specialist, Rm 4217, Ex 4463.

Legal Division
J. Howard Marshall, chief counsel, Rm 6647, Ex 4100.
Mortimer A. Kline, associate chief counsel, Rm 6647, Ex 4481.
David M. Hudson, assistant chief counsel, Rm 7510-A, Ex 793.
Robert E. Friedman, assistant chief counsel, Rm 7510, Ex 668.
Adolph H. Levy, principal attorney, Rm 6620, Ex 4838.
Wallace E. Avery, principal attorney marketing division, Rm 4248, Ex 2978.
John F. Jones, principal attorney production division, Rm 7415, Ex 3298.
John F. H. Leonard, principal attorney refining division, Rm 5346, Ex 4832.
Webb Shaddle, principal attorney materials division, Rm 5317, Ex 3274.
George A. Wilson, principal attorney transportation division, Rm 5408-A, Ex 4898.
Justin R. Wolf, principal attorney natural gas & natural gasoline division, Rm 6642, Ex 2130.

Marketing Division
Robert T. Collier, director, Rm 4257, Ex 4646.
Paul A. Best, assistant director, Rm 4258, Ex 3518.
Joseph H. Ellender, chief of economics and analysis section, Rm 4258, Ex 2302.
D. C. Arnold, chief of asphalt section, Rm 4020, Ex 2715.
Howard Cooper, chief of lube oils and containers section, Rm 4244, Ex 4313.
Robert W. MacMillan, chief of marketing equipment section, Rm 4038, Ex 2781.
Kenneth Darling, chief fuel oil section, Rm 4253, Ex 4440.
Hamilton H. Wende, chief of facilities section, Rm 4347, Ex 4751.
John Downing, chief of motor fuels section Rm 4340, Ex 2881.
Joseph H. Thompson, chief of administrative section.
Patrick J. Ryan, chief of reclamation section.

Materials Division
Frank A. Watts, director, Rm 5312, Ex 4585.
Howard C. Turner, assistant director, Rm 5308, Ex 2736.
Lewis W. Breyfogle, allocations and allotments, Rm 5324, Ex 3683.
H. R. Hansen, materials applications, Rm 5316, Ex 3411.
W. L. Clark, production requirements planning, Rm 5323, Ex 2721.
I. G. Harmon, projects, Rm 5313, Ex 3430.

Natural Gas and Natural Gasoline Division
E. Holley Poe, director, Rm 7314, Ex 4736.
Paul M. Raigorodsky, assistant director, Rm 7314, Ex 4774.
Dr. Frank H. Dotterweich, consultant, Rm 7326, Ex 4840.
James E. Pew, chief of natural gasoline section, Rm 7318, Ex 4871.
John H. Thacher, Jr., technical consultant, Rm 7326, Ex 4840.
Charles E. Webber, senior analyst (natural gasoline) Rm 7320, Ex 3350.
Robert W. Ducker, chief of natural gas section, Rm 7322, Ex 2524.
Thomas R. Weymouth, consultant, natural gas section, Rm 7326, Ex 4840.

Petroleum Supply Division
Robert Lee Minckler, director, Rm 5210, Ex 4834.
R. C. Sauer, assistant director, Rm 5212, Ex 2083.

Production Division
Donald R. Knowlton, director, Rm 7410, Ex 4231.
Ralph J. Schilthuis, assistant director, Rm 7416, Ex 2907.
Millard K. Neptune, assistant to director, Rm 7413, Ex 4826.
David G. Hawthorne, chief of materials and equipment section, Rm 7416, Ex 4689.
Joseph Gordon, economics and supply, Rm 7421, Ex 2984.

Refining Division
E. D. Cumming, director, Rm 5257, Ex 3233.
Phillip M. Robinson, assistant director, Rm 5260, Ex 4786.
Robert B. Cragin, chief of supply section, Rm 5022, Ex 3237.
Douglas P. Bailey, chief of operations section, Rm 5040, Ex 4877.
Max B. Miller, chief of construction section, Rm 3310, Ex 4560.
George Parkhurst, chief of facilities section, Rm 5254, Ex 3941.
Dr. M. R. Mandelbaum, acting chief of process development section, Rm 5216 Ex 4619.

Research Division
Edward B. Swanson, director, Rm 7315, Ex 649.
C. D. Lockwood, assistant director, Rm 7317, Ex 4777.

Petroleum Supply and Distribution Board
Walter R. Lange, secretary, Rm 5423, Ex 4744.
Joseph Winterberger, chief supply technician, Rm 5425, Ex 4437.

Division of Reserves
W. B. Heroy, director, Rm 7516, Ex 4454.

Transportation Division
Maj. J. R. Parten, director, Rm 5412, Ex 4418.
W. C. Kinsolving, assistant director, Rm 5414, Ex 3557.
Lee R. Cowles, assistant director, Rm 5413, Ex 3658.
Walter R. Lange, assistant director, Rm 5423, Ex 4744.
Donald A. Sears, chief of pipeline section, Rm 5418, Ex 4833.
Boyd Wilson, chief of tank car section, Rm 5415, Ex 4620.
S. D. Archbold, chief of inland waterways section, Rm 5045, Ex 4333.
Arch Turner, chief of motor transportation section, Rm 5419, Ex 4300.
Frank I. Brinegar, chief of appraisal section, Rm 5420, Ex 4627.

WPB Representatives at PAW
R. R. McLachlen, Rm 6620, Ex 4616.
Foster C. Boop, Rm 5228, Ex 2155.

Liaison
Gen. Walter B. Pyron
Liaison agent between Army Department and OPC, Rm 4D577, Ex 5042. Pentagon Bldg., Arlington, Va., REpublic 6700.

War Production Board

New Social Security Bldg., 4th and Independence Ave., S.W., Phone REpublic 7500.
Donald M. Nelson, chairman, Rm 5055, Ex 2113.
William L. Batt, vice-chairman, Rm 5055, Ex 2212.
Stephen E. Fitzgerald, director, division of information, Rm 5525A, Ex 5242.
Ernest Kanzler, director general for operations, Rm 5006, Railroad Retirement Bldg., Ex 3394.
Paul C. Cabot, Chief of salvage branch, 10th floor Gas & Light Bldg., Ex 7152.
E. W. Greb, Deputy director of salvage branch, 9th floor Gas & Light Bldg., Ex 72398.
R. T. Lawrence, oil unit head, 9th floor WGLB, Ex 72355.

Liaison, WPB-OPC-RFC
R. Otis McClintock, Rm 5193 A, Ex 71181.

Rubber Administrator
William Jeffers, Rm 5027, Ex 3256.
Bradley Dewey, assistant, Rm 5014, Ex 2455.

Office of Price Administration

Federal Office Bldg., No. 1, 2nd and D St., S.W., Phone REpublic 7500.
Prentiss M. Brown, price administrator, Rm 4130 Census Bldg., Ex 5586.
Dr. J. K. Galbraith, deputy administrator in charge of price, Rm 5131 B, Ex 5203.
W. Page Keeton, chief of petroleum and petroleum products branch, Rm 1606 Temp. D Bldg., Ex 6348.
Michael Joel, administrative officer petroleum section, Rm 6305, Ex 5389.
George Doffing, price executive of petroleum section, Rm 6305 A, Ex 5386.
Joseph H. Salmon, associate price executive, Rm 6304 A, Ex 6376.
Robert Collacott, head of marketing section, Rm 6313, Ex 6636.
Edward W. Doherty, chief of economic analyst unit, Rm 6316, Ex 6370.
Peter Jensen, head of fuel oils unit, marketing division, Rm 6314, Ex 4916.
Leo Van Herpe, chief of fuel section accounting division, Rm 6320, Ex 5539.
Watson B. Joyes, head of crude oil production section, Rm 6315, Ex 4403.
Joel Dean, chief of fuel rationing division, Rm 258 Temp. D Bldg., Ex 73411.
Sumner T. Pike, director fuel price division, Rm 6306-B, F. O. Bldg., Ex 76288.

U. S. Tariff Commission

7th & F St., N.W., Phone NAtional 3947.

Petroleum Accounting Section
Kenneth L. Stone, chief, Rm 155, Ex 123.

Office of Defense Transportation

Interstate Commerce Commission Bldg., Constitution Ave. & 78th St., N.W., Phone REpublic 7500.
Joseph B. Eastman, director, Rm 5136, Ex ICC 719, 3527.
Fayette B. Dow, director of pipelines, tank cars, tankers and tank trucks, Rm 5132, Ex 73207.
J. G. Scott, counsel, Rm 5418, Ex 2460.

Motor Transport Division
John L. Rogers, director, Rm 4211, Ex 2297.
Sam F. Niness, chief of petroleum carrier section, Rm 2406 New P.O. Bldg. Ex 6351.
W. T. Cumming, chief of vehicle maintenance section, Rm 2405 New P.O. Bldg. Ex 72731.
T. L. Preble, consultant, vehicle maintenance section, Rm 4215 Labor Bldg., Ex 72775.
R. D. Thomas, chief of tire maintenance section, Rm 4209, Labor Bldg., Ex 71446.
H. H. Kelly, chief of allocation section, Rm 2430 New P.O. Bldg., Ex 73027.

Congress

Congressional Oil Investigating Committee
Rep. Clarence F. Lea, Calif., chairman, New House Office Bldg., Rm 1535. Ex 699.

Senate Oil Shortage Investigating Committee
Sen. Francis Maloney, chairman, Senate Office Bldg., Rm 354, Ex 1196, Phone NAtional 3120.

Petroleum Industry War Council

Rm. 919 Commonwealth Bldg., 1625 K St., N. W., Phone DIstrict 2820.
William R. Boyd, Jr., chairman.
Allan H. Hand, secretary-treasurer.

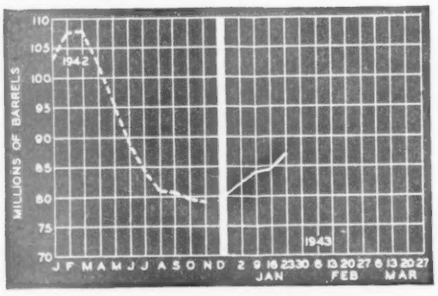
U. S. Maritime Commission

Rm. 4309, Ex 87, 88, 89.
B. B. Jennings, director of tanker operations, War Shipping Administration, Commerce Department, Phone REpublic 6620.

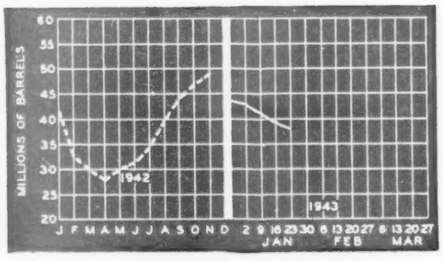
STATISTICS

Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.

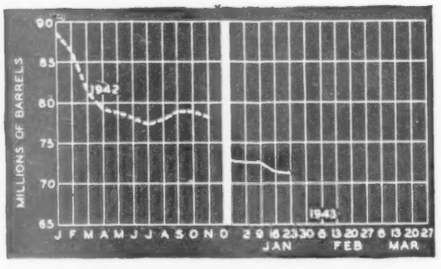
Gasoline Stocks (Finished & Unfinished)



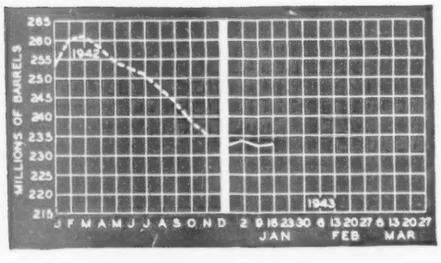
Gas Oil and Distillate Stocks



Residual Fuel Oil Stocks



Crude Stocks



Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

	Daily Potential Refining Capacity Week Ended		Per Cent of Refining Capacity Reporting Week Ended		Daily Average Crude Runs to Stills Week Ended		Per Cent of Reporting Capacity Operated Week Ended	
Districts	Jan. 23	Jan. 16	Jan. 23	Jan. 16	Jan. 23	Jan. 16	Jan. 23	Jan. 16
Combined‡	2,438	2,438	88.2	88.2	1,586	1,633	65.1	67.0
Appalachian	177	177	84.8	84.8	157	160	88.7	90.4
Ind., Ill., Ky.	811	811	85.0	85.0	746	728	92.0	89.8
Okla., Kans., Mo.	416	416	80.1	80.1	320	318	76.9	76.4
Rocky Mt.	147	147	48.0	48.0	107	101	72.8	68.7
California	817	817	89.9	89.9	699	700	85.6	85.7
Total U. S.—B. of M. Basis	4,806	4,806	85.9	85.9	3,615	3,640	75.2	75.7
U. S.—B. of M. Basis Jan. 24, 1942					3,874			

	Gasoline Production at Refineries inc. Natural Blended Week Ended		Stocks of Finished and Unfinished Gasoline Week Ended		Total Stocks Gas Oil & Distillates Week Ended		Total Stocks Residual Fuel Oil Week Ended	
Districts	Jan. 23	Jan. 16	Jan. 23	Jan. 16	Jan. 23	Jan. 16	Jan. 23	Jan. 16
Combined‡	4,562	4,684	37,992	37,203	18,443	19,821	10,963	11,635
Appalachian	388	372	2,807	2,829	683	708	495	485
Ind., Ill., Ky.	2,273	2,381	17,828	17,150	4,952	5,220	2,568	2,480
Okla., Kans., Mo.	1,078	1,130	7,202	7,051	1,544	1,619	1,348	1,377
Rocky Mt.	341	311	1,798	1,707	364	359	568	554
California	1,649	1,848	19,475	19,015	12,048	12,114	55,274	55,267
Total U. S.—B. of M. Basis	10,291	10,726	87,102°	84,955	38,034	39,841	71,216	71,798
U. S.—B. of M. Basis Jan. 24, 1942	13,048		99,345		42,307		90,764	

°Finished 77,291,000 bbl.; Unfinished 9,811,000 bbl.
‡Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts.

Production of Natural Gasoline and Allied Products

(Bureau of Mines figures in thousands of gallons)

	Nov. 1942	Oct. 1942
East Coast		
W. New York	1	2
W. Pennsylvania	1,475	1,292
West Virginia	9,279	8,531
Ohio	439	513
Illinois	13,009	13,417
Kentucky	3,278	3,216
Michigan	135	149
Kansas	7,335	6,806
Oklahoma	37,633	39,020
Texas:	133,925	135,055
Gulf	33,912	33,718
East Texas	26,089	28,341
Panhandle	37,080	34,505
Other	36,844	38,491
Arkansas	3,738	3,867
Louisiana:	26,223	26,719
Gulf	6,214	6,601
Inland	20,009	20,118
New Mexico	7,336	7,456
Colorado	35	29
Montana	421	356
Wyoming	3,265	3,360
California	53,025	54,964
Total	300,552	304,752
Daily average	10,018	9,831
Total (thousands of bbls.)	7,158	7,256
Daily average	239	234

N. P. N. Gasoline Index

	Dealer T.W.	Tank Car
	Cents Per Gal.	
Feb. 1	10.47	6.70
Month ago	10.47	6.66
Year ago	10.19	6.73

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

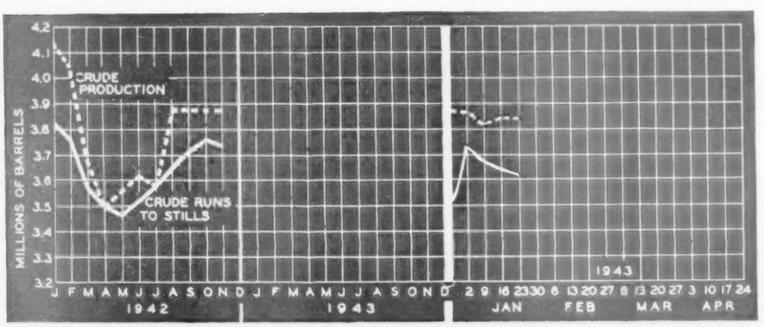
Tank car index is a weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

You can have—

NATIONAL PETROLEUM NEWS delivered to you at home every week for 52 weeks. Only $5 per year -- Less than 10c per week.

Send your order to:

NATIONAL PETROLEUM NEWS
1213 W. Third St., Cleveland, Ohio

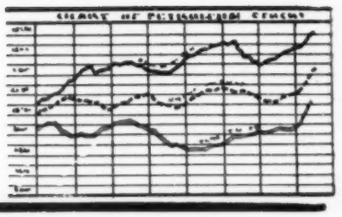

MILLIONS OF BARRELS
CRUDE PRODUCTION
CRUDE RUNS TO STILLS
1942
1943
J F M A M J J A S O N D J F M A M J J A S O N D 2 9 16 23 30 6 13 20 27 6 13 20 27 3 10 17 24
JAN FEB MAR APR

U. S. Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Jan. 23 Barrels (Daily Average)	WEEK ENDED Jan. 16 Barrels (Daily Average)		WEEK ENDED Jan. 23 Barrels (Daily Average)	WEEK ENDED Jan. 16 Barrels (Daily Average)
Oklahoma	346,650	347,400	Eastern (Ill. & Ind. excluded)	90,200	90,500
Kansas	307,500	300,650	Michigan	58,900	62,400
Nebraska	2,450	2,650	Wyoming	85,300	88,400
Texas	1,330,900	1,328,800	Montana	22,450	22,550
Louisiana	338,200	339,900	Colorado	6,400	6,700
Arkansas	75,050	75,150	New Mexico	98,300	98,000
Mississippi	57,500	58,550	California	774,800	785,000
Illinois	240,050	228,300			
Indiana	14,350	14,550	Total U. S.	3,849,000	3,849,500

Oil MARKETS



Pennsylvania

NEW YORK—Western Penna. refiners reported prices unchanged throughout the week. Demand for gasoline reportedly increased following the ban on tank car shipments into District 1 from points outside. Several refiners said they had received exceptions to their PAO No. 1 quotas; only one said he was putting more gasoline into storage than he would have under normal circumstances. Kerosine and fuel oil demand continued heavy.

Mid-Western

CHICAGO, Jan. 30—Fear that gasoline storages in the Mid-West might become acute was expressed by one mid-western refiner last week. Several mid-westerns said gasoline consumption is continuing on a downward trend but one central Michigan refiner reported gasoline "picking up" so far this month.

Fuel oil and lubricating oils continued in strong demand with supplies scarce, according to mid-western and central Michigan refiners.

No price changes were reported for the week.

Mid-Continent

TULSA, Jan. 30—Price for No. 6 fuel was up 10c to 90c flat in Oklahoma the past week when one of the two refiners quoting withdrew his 80c open spot quotation from the market. Kerosine, 42-44 w.w., was off 0.125c on the high to 4.5c flat when Oklahoma refiner reduced his quotations that amount for 41-43 and 42-44 w.w. grades; price range for 41-43 remained unchanged. Quotations for all other refined products unchanged. No open spot sales reported.

Shipments of gasoline from Mid-Continent were off an undetermined amount because of PAO No. 5 banning tank car shipments to District 1. Local demand was increasing, several said.

Some refiners, notably in Kansas and Texas, said transportation scarcity somewhat relieved as cars shifted from gasoline to fuels for District 1 movement.

Demand for all grades of fuels continued extremely heavy and supplies remained low.

Atlantic Coast

NEW YORK, Jan. 30—Drain for war needs on east coast petroleum stocks originally destined for domestic consumption continued along the seaboard the last week in January. Light oils were still "on the critical list", they said.

Baltimore supplier who had been working on a day-to-day basis said he was unable to take care of even regular customers fully, particularly on kerosine and fuel oils and "between rationing, non-discrimination rulings, and shortages of supplier" was "gravely concerned" over the situation.

Gulf

NEW YORK, Jan. 30—Higher prices for tank car and tank truck lots of 41-43 w.w. kerosine were reported the past week by a Gulf Coast refiner who had been quoting the grade at 3.875c. He said he was now quoting 4c and 4.125c, respectively, creating a new range of 3.875c to 4c for tank car lots.

Same refiner said he was again offering No. 2 fuel—at 3.75c for prompt tank car shipment.

Other refiners reported no changes in quotations, open spot sales, or firm inquiries.

California

LOS ANGELES, Jan. 30—Gasoline price situation among independent refiners has not improved. At the extreme bottom of the range the 3 grades are selling for 4.5c, 5c, and 6c.

Other products continue to sell at the ceiling prices.

Crude Prices

(No changes reported as of Feb. 1)

Changes in crude oil prices are so few and far between—only 1 change in the last 9 months—that the two pages of crude oil price tables which have appeared every week in this market section, hereafter will be printed only when there are sufficient changes in prices to warrant it.

In the meantime a record will be kept in the Cleveland office of NPN and OILGRAM from which the publishers will be glad to make proofs, or letters or affidavits as to what the prices are, and without charge to regular subscribers. Changes in crude oil prices will be specially noted in this market section when made.

By this arrangement NPN and OILGRAM believe they will take care of any who may have contracts for petroleum products based on crude prices appearing in NPN each week.

Keeping these prices in this way gives NPN two more pages of space for editorial material, which space is very much needed because of the increasing flow of news from Washington.—WCP, publisher.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

(For orders issued prior to November see earlier issues of NPN)

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Nov. 6, '42—Increase in kerosine tank car prices f.o.b. Jacksonville	Nov. 11, p. 10	Nov. 6, p. 1	P. 300.62
Nov. 12, '42—Provisions for collection of new lube oil tax set up	Nov. 18, p. 9	Nov. 12, p. 1	P. 272.30 P. 300.65
Nov. 12, '42—Maximum for Texas Panhandle No. 6 fuel oil set at 74c per bbl.	Nov. 18, p. 36	Nov. 12, p. 1	P. 300.66
Nov. 13, '42—Maximum prices for No. 2 fuel oil in Minneapolis-St. Paul area	Nov. 18, p. 9	Nov. 13, p. 2	P. 300.68
Nov. 16, '42—Revocation of Oct. 22 Michigan prices	Nov. 18, p. 9	Nov. 16, p. 2	P. 300.71
Nov. 19, '42—Maximum prices for Bunker C and No. 6 fuel oil at Mobile	Nov. 25, p.	Nov. 19, p.1	P. 300.73
Nov. 19, '42—Louisiana and Texas Gulf Coast Diesel ceilings adjusted	Nov. 25, p. 23	Nov. 19, p. 1	P. 300.74
Nov. 25, '42 — Connersville, Ind. tank wagon price on No. 2 fuel oil increased	Dec. 2, p. 8	Nov. 25, p. 1	P. 300.78
Dec. 26, '42—Service station 3c margin made nationwide	Dec. 30, p. 13	Dec. 28, p. 2	P. 272.33
Dec. 29, '42—Fuel oil price increase of .3c in rationed area	Jan. 6, p. 8	Dec. 28, p. 3	P. 300.81 P. 272.35
Dec. 29, '42—Aviation gasoline of 87 Octane and over exempt from price control	Jan. 6, p. 10	Dec. 29, p. 1	P. 300.85
Dec. 29, '42—Maximum prices set for light fuel oils in Boston area	Jan. 6, p. 11	Dec. 31, p. 1	P. 300.86 P. 272.37
Jan. 4, '43—Gasoline tank wagon price increase set for Quincy, Ill.	Jan. 6, p. 11	Jan. 5, p. 1	P. 300.91 P. 272.39
Jan. 4, '43—Residuals and distillates redefined; specific prices set at certain ports	Jan. 6, p. 15	Jan. 4, p. 1	P. 300.93
Jan. 4, '43—Maximum prices set for kerosine, light fuel oils in New York City	Jan. 20, p. 12	Jan. 6, p. 2	P. 300.96 P. 272.40
Jan. 4, '43—Specific prices set for Beverly Hills, Calif. crude	Jan. 13, p. 27	Jan. 6, p. 1	P. 301
Jan. 25, '43—Dollar and cents ceilings set for Western residuals	Jan. 27, p. 15	Jan. 25, p. 2	P. 300.99
Jan. 26, '43—Specific prices set for Pacific heavy fuels	Jan. 27, p. 8	Jan. 26, p. 2	P. 300.103

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum News are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices), or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (Jan. 25 to Feb. 1)

U. S. Motor, (ASTM octane)	Monday Feb. 1	Friday Jan. 29	Thursday Jan. 28	Wednesday Jan. 27	Tuesday Jan. 26
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7 (2)	7 (2)	7 (2)	7 (2)	7 (2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.8 – 6	5.8 – 6	5.8 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5–5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.4 – 5.5	5.4 – 5.5	5.4 – 5.5	5.4–5.625 (a)	5.4–5.625 (a)
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75 (1)	5.75 (1)	5.75(1)	5.75 (1)
60 octane & above:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N.M. dest'ns.)	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 – 10.2
New York harbor, barges	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3
Philadelphia district	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)	7.5–7.75 (2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	Feb. 1	Jan. 25
OKLAHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62, 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7.125
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6 – 7
72-74 oct.	5.8 – 6	5.8 – 6
63-66 oct.	5.4 – 5.5	5.4 – 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375 (1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75 (1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	Feb. 1	Jan. 25
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct. "	5.875 (1)	5.875 (1)
62 oct. "	5.5 (1)	5.5 (1)
60 oct. & below, unleaded	5.375 (1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 (1)	7.5 (1)
Str. run gasoline, excluding Detroit shpt.	5 – 6	5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	6 – 8.75	6 – 8.75
70-75 oct. (regular)	5.5 – 7.75	5.5 – 7.75
65 oct. & below (3rd grade)	4.5 – 6.75	4.5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	Feb. 1	Jan. 25
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5	4.5 – 4.625
Range Oil	4 – 4.125	4 – 4.125
No. 1 P.W.	3.875	3.875
No. 1 straw	3.875– 4 (1)	3.875– 4 (1)
No. 2 straw	3.625	3.625
No. 3 fuel	3.5 (1)	3.5 (2)
U. G. I. Gas Oil	3.625–3.75 (1)	3.625–3.75(1)
No. 6 fuel	$0.90 (1)	$0.80-$0.90(2)
14-16 fuel	$0.95 (1)	$0.95 (1)
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375	4.375
42-44 grav. w.w.	4.5 (2)	4.5 (2)
Range Oil	4	4
No. 1 p.w.	3.875 (1)	3.875
No. 2 straw	3.625	3.625
No. 3	3.5	3.5
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80 (1)	$0.80 (1)
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.25– 4.75	4.25 – 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2(2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	No Price	No Price
KANSAS (For Kansas destinations only)		
41-43 grav. w.w.	No Price	No Price
42-44 grav. w.w.	4.7 –4.875(2)	4.7 –4.875 (2)
No. 1 p.w.	4.1 –4.25 (2)	4.1–4.25 (2)
No. 6 fuel	$0.85 (1)	$0.85 (1)

REFINERY PRICES (Continued)

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, & Gas Fuel Oil

(Cont'nued)

Prices in Effect	Feb. 1	Jan. 25
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, for shpt. to Ark. points only	5.125 (1)	5.125 (1)
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.25 – 7.75	6.25 – 7.75
46 grav. w.w.	6.25 (1)	6.25 (1)
No. 1 fuel	6.5 – 7.75	6.25 – 7.75
No. 2 "	6.375– 7.625	6.25 – 7.625
No. 3 "	6.25 –7.75	6.25–7.75
36-40 gravity	6.25 –6.5 (2)	6.25–6.5 (2)
Other districts:		
45 grav. w.w.	6.125– 7.625	6.125– 7.625
46 grav. w.w.	6.125– 6.625	6.125– 6.25
47 grav. w.w.	6.25 – 6.75	6.25 – 6.375
No. 1 fuel	6 – 6.375	5.875– 6
No. 2 "	6.125– 7.125	5.875– 7.125
No. 3 "	6.125– 7.125	5.875– 7.125
36-40 grav., Pittsburgh dist. prices excluded	6.125– 7	5.875– 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.8 – 6	5.8 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw	5	5
U.G.I. gas oil	4.5 (2)	4.5 (2)
Fuel Oils (Vis. at 100).		
300-500 Vis.	....	....
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	4.5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$0.85 (2)	$0.85(2)
Light fuel	$0.95 (2)	$0.95 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
Los Angeles:		
Heavy fuel	$0.80–0.85 (2)	$0.80–0.85 (2)
Light fuel	$0.85–0.95 (2)	$0.85–0.95 (2)
Diesel fuel	3 – 5 (2)	3 – 5 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
San Francisco:		
Heavy fuel	$0.90 (1)	$0.90 (1)
Light fuel	$1.00 (1)	$1.00 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals—No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	31.5 (1)	31.5 (1)
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	23–26 (b)	23–26 (b)
150 Vis. (143 at 100°) 400-405 fl.		
0 p.t.	29.5 (1)	29.5 (1)
10 p.t.	28.5 (1)	28.5 (1)
15 p.t.	27.5 (1)	27.5 (1)
25 p.t.	21–24 (b)	21–24 (b)

(b) Offered by Mid-Western sales agent at 1c off low.

Cylinder Stocks

Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl.	16	16
630 fl.	17	17

MID-CONTINENT (F. o. b. Tulsa)

Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)

Pale Oils:

Vis. Color		
60-85—No. 2	8	8
86-110—No. 2	8.5	8.5
150—No. 3	14.5	14.5
180—No. 3	15	15
200—No. 3	15	15
250—No. 3	16–16.5	16–16.5
280—No. 3	17	17
300—No. 3	18	18

Lubricating Oils (Cont'd)

Prices in Effect	Feb. 1	Jan. 25
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°		
200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (2)	22 (2)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

QUALIFYING PRICE NOTE: This note qualifies Mid-Continent Bright and Lube prices herewith. Refiners admit these tables show only their "posted prices" and that they make discounts from these in varying amounts depending on location of buyer and degree of competition of from 2c to 3½c on Bright Stock and upwards of 2c on neutrals. Discounts are made for immediate sale as well as for contracts. Some buyers report these discounts as high as 5c on bright and 3½c on neutrals but have not submitted written evidence.

SOUTH TEXAS Neutral Oils

Vis. Color		
Pale Oils: (*Vis. at 100°F.*)		
100 No. 1½-2½	6.5	6.5
200 No. 2-3	8.75	8.75
300 No. 2-3	9.25	9.25
500 No. 2½-3½	10	10
750 No. 3-4	10.25	10.25
1200 No. 3-4	10.375	10.375
2000 No. 4	10.5	10.5
Red Oils:		
100 No. 5-6	6.5 (2)	6.5 (2)
200 No. 5-6	8.75	8.75
300 No. 5-6	9.25	9.25
500 No. 5-6	10	10
750 No. 5-6	10.25	10.25
1200 No. 5-6	10.375	10.375
2000 No. 5-6	10.5–11.5	10.5–11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils

Vis. Color		
60-85—No. 2	9.5 (1)	9.5 (1)
86-110—No. 2	10 (1)	10 (1)
150—No. 3	15.5 (1)	15.5 (1)
180—No. 3	16 (1)	16 (1)
200—No. 3	16 (1)	16 (1)
250—No. 3	17	17
Red Oils:		
180—No. 5	16 (1)	16 (1)
200—No. 5	16 (1)	16 (1)
250—No. 5	17 (1)	17 (1)
280—No. 5	18 (1)	18 (1)
300—No. 5	18.5 (1)	18.5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)		
140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)
Bright stocks, 160 vis. at 210 No. 8 color:		
0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3		
Grade 26-70	3.875 (Qtns.)	3.875 (Qtns.)
FOB BRECKENRIDGE		
Grade 26-70	3.5 (Qtns.)	3.5 (Qtns.)
CALIFORNIA (FOB plants in Los Angeles basin)		
21 pound vapor pressure for blending	4.75 – 5.375	4.75 – 5.375

Naphtha and Solvent

Prices in Effect (FOB Group 3)	Feb. 1	Jan. 25
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	8.375– 8.625	8.375– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7 (2)	7 (2)
Stoddard solvent	7 – 7.25	7 – 7.25
OHIO (S. O. quotations for statewide delivery): V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25 (2)
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L., FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)
CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)		
Fully refined:		
122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)		
Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.125	4.375– 5.125
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.5	3.125– 3.5
Red	3 – 3.25	3 – 3.25

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

(Cents Per Gal.)

	Gasoline Kerosine	*Distillate Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516
Decatur, Ill.	2.244	2.244	2.442
Joliet, Ill.	2.508	2.508	2.516
Peoria, Ill.	2.310	2.310	2.442
Quincy, Ill.	2.178	2.178	2.294
Indianapolis, Ind.	2.640	3.034	3.034
Evansville, Ind.	2.442	2.886	2.886
South Bend, Ind.	3.135	3.135	3.330
Detroit, Mich.	4.290	3.996	3.996
Grand Rapids, Mich.	3.828	3.828	3.922
Saginaw, Mich.	4.290	4.144	4.144
Green Bay, Wis.	2.838	2.838	3.182
Milwaukee, Wis.	2.706	2.706	2.738
La Crosse, Wis.	2.574	2.574	2.886
Minneapolis-St. Paul	2.574	2.574	2.886
Duluth, Minn.	2.838	2.838	3.256
Mankato, Minn.	2.574	2.574	2.886
Des Moines, Ia.	2.046	2.046	2.294
Davenport, Ia.	2.310	2.310	2.442
Mason City, Ia.	2.376	2.376	2.664
St. Louis, Mo.	2.046	2.046	2.072
Kansas City, Mo.	1.518	1.518	1.776
St. Joseph, Mo.	1.518	1.518	1.776
Fargo, N. D.	3.564	3.564	3.996
Huron, S. D.	3.036	3.036	3.330
Wichita			
From Ponca City	0.528	0.528	0.592
From Tulsa	0.858	0.858	0.962
From Cushing	0.792	0.792	0.888

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

(NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.)

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher from others. Refiners' prices and sales shown; bids reported in market leads

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect Feb. 1

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	....	9.2 – 10.2	9.2 (1)
N. Y. Harb., barges	....	9.1 – 9.3	9.1 (1)
Albany	....	9.3 – 9.5	....
Philadelphia	....	9.2 – 9.7	....
Baltimore	....	8.95	8.85 (1)
Norfolk	....	8.7 – 8.95	8.5 (1)
Wilmington, N. C.	....	8.7 – 8.75	8.5 (1)
Charleston	....	8.7-8.8 (2)	8.1 (1)
Savannah	....	8.25 – 8.75	....
Jacksonville	....	8.275 (1)	....
Miami	....	....	....
Tampa	....	8.275– 8.4	8.275 (1)
Pensacola	....	7 –7.2 (1)	6.6 –6.8 (1)
Mobile	....	7 – 7.9	6.6 –6.8 (1)
New Orleans	....	6.25 – 6.75	....
Portland	....	9.5 – 9.65	....
Boston	....	9.4 – 9.7	9.7 (1)
Providence	....	9.4 – 9.7	....

FUEL OILS

	KEROSINE and /or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	6.8	6.7	6.7	$1.95–2.10 (a)	$1.65
N. Y. Harb., barges	6.7	6.6	6.6	....	....
Albany	7	6.8	6.8 (2)	$2.25 (1)	$1.85 (1)
Philadelphia	6.9	6.7	6.7	$1.98	$1.65
Baltimore	6.9	6.7	6.7	....	$1.65
Norfolk	6.8	6.7	6.7 (1)	....	$1.65 (2)
Wilmington, N. C.	6.75	6.7	....	....	....
Charleston	6.9	6.7 (2)	....	....	$1.60 (2)
Savannah	6.75 (2)	....	....	....	$1.60 (1)
Jacksonville	6.75 (2)	6.25	....	....	$1.60 (1)
Miami	6.75 (1)	....	....	....	....
Tampa	6.75	6.25 (2)	....	....	$1.50 (1)
Pensacola	4.8 (1)	....	....	....	....
Mobile	4.75 (2)	....	....	....	....
New Orleans	4.25 – 4.45	3.75 –3.875 (2)	....	$1.25 (1)	$0.85 (1)
Portland	7	6.8	6.8 (2)	$2.25 (1)	$1.65 (1)
Boston	6.9	6.7	6.7 (2)	$1.95 (2)	$1.65
Providence	6.9	6.7	6.7 (2)	$1.90–$1.95 (2)	$1.65

(a) This price is for a straight-run low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65	$2.78	6.7–6.8 (2)	6.8 (2)
Albany	$1.85 (1)	$2.98 (1)	6.8 (1)	7 (1)
Philadelphia	$1.65	$2.78	....	....
Baltimore	$1.65	$2.78	6.7 (1)	6.7 (1)
Norfolk	$1.65	$2.78	6.7 (1)	6.7 (1)
Charleston	$1.60	$2.78 (2)	6.7 (1)	6.7 (1)
Savannah	$1.60 (1)	$2.62 (1)	....	....
Jacksonville	$1.60 (2)	$2.62 (2)	....	....
Tampa	$1.50 (2)	$2.62 (2)	....	....
New Orleans	$0.85	$1.65 (2)	4 (1)	....
Portland	$1.65 (1)	$2.86 (2)	6.8 (1)	6.9 (1)
Boston	$1.65	$2.78	6.7 (2)	6.8 (2)
Providence	$1.65	$2.78 (2)	6.7 (1)	6.8 (1)

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices In Effect Feb. 1

Crude Scale	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow.	4.25 (1)	....	4.25 (1)
122-4 White.	....	4.25 (2)	4.25 (2)
124-6 White.	4.25 (1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Naphtha

Prices in Effect Feb. 1

	V.M.&P. Naphtha	Mineral Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices in Effect	Feb. 1	Jan. 25
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
390 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 oct.	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44 grav. w.w. kero.	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price
In Ship's Bunkers, or deep tank lots:		
Diesel Fuel, Pac. Spec. 200	$1.40 –$1.45	$1.40 –$1.45
Grade C fuel, Pac. Spec. 400	$0.825–$0.85	$0.825–$0.85
Cased Goods: (Per case)		
375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav., w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permitted on above rate by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

(Prices for sales made or firm offers reliably reported for sales pending in cargoes FOB ship at Gulf, for minimum of 20,000 bbls. Prices are by refiners only to other refiners, export agents, or to large tanker terminal operators at the customary trade specifications noted.)

Prices In Effect Feb. 1

Domestic

Motor Gasoline	
Min. 80 oct. '39 Research, max. 2cc lead	5.75
60-62 Gravity, Max. 400 e.p. (a)	6.25 – 6.9
72-74 oct. leaded (ASTM)	5.75
70 oct. unleaded "	5.5 – 5.625
68 oct. " "	5.25 – 5.625
65 oct. " "	5.125
60 oct. " "	5
41-43 w.w. kerosine	3.875– 4
42-44 w.w. kerosine	3.875
No. 2 fuel	3.75
63-65 oct. leaded (ASTM)	5.35
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	3.75
43-47 " "	3.875
48-52 " "	3.875– 4
53-57 " "	4 – 4.125
58 & above diesel index	4.25
Diesel Oil, ship's bunkers (ex-lighterage)	$1.65
Bunker C, " " "	$0.85
Bunker C, cargoes	$0.85

(a) 80 Oct. Ethyl (ASTM), Max. 3 CC lead.

Export

Motor Gasoline	
60-62 Gravity, Max. 400 e.p. (a)	6.25 – 6.9
72-74 oct. leaded (ASTM)	5.75
70 oct. unleaded "	5.5 – 5.625
68 oct. " "	5.25 – 5.625
65 oct. " "	5.125
60 oct. " "	5
41-43 w.w. kerosine	3.875– 4
42-44 w.w. kerosine	3.875
No. 2 fuel	3.75
63-65 oct. leaded (ASTM)	5.35
Gas Oil—Less than ½ of 1% sulfur.	
Below 43 diesel index	3.75
43-47 " "	3.875
48-52 " "	3.875– 4
53-57 " "	4 – 4.125
58 & above diesel index	4.25

(a) 80 Oct. Ethyl (ASTM), Max. 3 CC lead.

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices In Effect Feb. 1

	Steel Drums	Bulk
200 Vis. D 210 brt. stock	35 (1)	28.8 (1)
150 vis. D 210 brt. stock 0-10 p.p.	31 (1)	24.8 (1)
10-25 p.p.	....	....
100 vis. D 210 brt. stock 0-10 p.p.	....	....
10-25 p.p.	....	....
200 vis. No. 3 col. neutral: 0-10 p.p.	....	....

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Feb. 1, 1943 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

Esso (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	9.7
*Newark, N. J.	10.2	10.7	4.5	9.7
Annapolis, Md.	10.55	11.05	5.5	11.5
Baltimore, Md.	9.95	10.45	5.5	10.5
Cumberland, Md.	11.35	11.85	5.5	12.0
Washington, D. C.	10.2	10.7	4.5	11.0
Danville, Va.	11.65	12.15	6.5	12.25
Norfolk, Va.	10.45	10.95	6.5	12
Petersburg, Va.	10.75	11.25	6.5	13
Richmond, Va.	10.75	11.25	6.5	13
Roanoke, Va.	11.95	12.45	6.5	12.5
Charleston, W. Va.	12.25	12.75	6.5	13.3
Parkersburg, W. Va.	11.55	12.05	6.5	13
Wheeling, W. Va.	11.55	12.05	6.5	13.6
Charlotte, N. C.	12.1	12.6	7.5	11.3
Hickory, N. C.	12.65	13.15	7.5	12.3
Mt. Airy, N. C.	12.5	13.0	7.5	11.5
Raleigh, N. C.	11.85	12.35	7.5	12.3
Salisbury, N. C.	12.15	12.65	7.5	12.7
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	9.7	9	9
Newark	9.7	9	9
Annapolis, Md.	....	9.25	....
Baltimore	9.5	9	9
Washington, D. C.	10	9.4	9.4
Norfolk, Va.	9.7	8.8	8.8
Petersburg	10	9	....
Richmond	10	9	9
Charlotte, N. C.	10.3	10.4	....
Hickory, N. C.	....	10	....
Raleigh	11.3	10.1	....
Charleston, S. C.	....	9	....
Columbia	....	10	....
Spartanburg	....	10.8	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

New York City	Com. Cons. T.W.	Undiv. Dlr. T.W.	Gasoline Taxes
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kerosine Yard	Kerosine TW	Mobilfuel Diesel TC	Mobilfuel Diesel TW	Mobilheat Fuel Yard	Mobilheat Fuel TW
New York:						
Manhat'n & Bronx	7.1	10	...	9.3	7	9
Kings & Queens	7.1	10	...	9.3	7	9
Richmond	7	10	...	...	6.9	8.8
Albany	7.2	9.5	7	9.3	7	9
Binghamton	8.6	10.9	...	10.7	8.4	10.2
Buffalo	8.3	10.6	8	10.3	8.2	10
Jamestown	8.4	10.7	...	10.6	8.3	10
Mt. Vernon	7.2	10	...	9.4	7.1	9
Plattsburg	7.6	9.4	...	9.9	7.6	9
Rochester	8.4	10.7	7.9	10.2	7.9	9.7
Syracuse	8.2	10.5	7.8	10.1	7.8	9.6
Conn.:						
Bridgeport	7.3	9.6	...	...	7.2	8.8
Danbury	7.8	10.1	...	...	7.5	8.8
Hartford	7.4	9.7	...	9.5	7.2	9
New Haven	7.1	9.4	...	9.3	7	8.9
Maine:						
Bangor	7.6	9.9	7.4	9.7	7.4	9.1
Portland	7.2	9.9	7	9.3	7	9
Mass.:						
Boston	7.5	10.3	6.9	9.2	7.1	9
N. H.:						
Concord	8.1	10.4	...	...	8.2	10
Lancaster	9.2	11.5	...	...	9.2	11
Manchester	8.2	10.8	...	...	7.9	9.7
R. I.:						
Providence	7.3	9.6	6.9	9.2	7.1	8.9
Vermont:						
Burlington	7.8	10.1	7.5	9.8	7.5	9.2
Rutland	8	10.3	...	10	7.7	9.5

*Does not include 1% city sales tax applicable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)

	Commercial T.W.	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	11.95
Pittsburgh	10.7	11.2	5.5	12.3
Allentown	10.7	11.2	5.5	12.3
Erie	10.7	11.2	5.5	12.3
Scranton	10.7	11.2	5.5	12.3
Altoona	10.7	11.2	5.5	12.3
Emporium	10.7	11.2	5.5	12.3
Indiana	10.7	11.2	5.5	12.3
Uniontown	10.7	11.2	5.5	12.3
Harrisburg	10.7	11.2	5.5	12.3
Williamsport	10.7	11.2	5.5	12.3
Dover, Del.	....	11.2	5.5	12.3
Wilmington, Del.	....	10.7	5.5	11.8
Boston, Mass.	....	10.9	4.5	....
Springfield, Mass.	....	11.8	4.5	....
Worcester, Mass.	....	11.5	4.5	....
Fall River, Mass.	....	11	4.5	....
Hartford, Conn.	....	11.6	4.5	....
New Haven, Conn.	....	11	4.5	....
Providence, R. I.	....	11	4.5	....
Atlantic City, N. J.	....	10.7	4.5	9.7
Camden, N. J.	....	10.7	4.5	9.7
Trenton, N. J.	....	10.7	4.5	9.7
Annapolis, Md.	....	11.05	5.5	10.5
Baltimore, Md.	....	10.45	5.5	10.5
Hagerstown, Md.	....	11.55	5.5	10.0
Richmond, Va.	....	11.25	6.5	12
Wilmington, N. C.	....	11.55	7.5	11.6
Brunswick, Ga.	....	10.4	7.5	‡10.8
Jacksonville, Fla.	....	10.4	8.5	11.8

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	6
Phila., Pa.	9.8	9	9	5.76	4.76
Allentown, Pa.	10.3	9.3	9.3	....	....
Wilmington, Del.	9.8	9	9	....	....
Springfield, Mass.	*9.9	9.4	9.4	....	....
Worcester, Mass.	*9.9	9.3	9.3	....	....
Hartford, Conn.	*9.7	9	9	....	....

‡Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio††

***Sohio X-70 Gasoline (*Regular Grade*)**

	Consumer T.W.	**Resellers	‡S.S.	Gasoline Taxes	†Kerosine T.W.
Ohio, Statewide	12	10	13.5	5.5	9.3
Akron	12	9.5	12.5	5.5	9
Cincinnati	12	9.5	12.5	5.5	9
Cleveland	12	9.5	12.5	5.5	9
Columbus	12	9.5	12.5	5.5	9
Dayton	12	9.5	12.5	5.5	9
Marietta	12	9.5	12.5	5.5	9
[illegible]	12	9.5	12.5	5.5	9
Toledo	12	9.5	12.5	5.5	9
Youngstown	12	9.5	12.5	5.5	9

Aviation Gasoline—Statewide

	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 87 Oct.(a)	17.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

(a) Effective Oct. 15, 1942.

	†Naphtha—T.W. Statewide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8.3	8.3	7.8	....
Cleveland	10.3	10.3	9.8	7.55

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price, 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals. or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Crown	Dealer Standard	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	9.5	8.5	6.5	9.25
Lexington, Ky.	10.5	8.5	6.5	9.25
Louisville, Ky.	10	9	6.5	8.75
Paducah, Ky.	10	8	6.5	8.75
Jackson, Miss.	10	9	7.5	*9
Vicksburg, Miss.	9.5	8.5	7.5	*8.5
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	10
Atlanta, Ga.	11.4	...	7.5	*11.8
Augusta, Ga.	11.4	...	7.5	*11.3
Macon, Ga.	11.4	...	7.5	11.8
Savannah, Ga.	10.4	...	7.5	*10.8
Jacksonville, Fla.	10.4	...	8.5	9.8
Miami, Fla.	10.4	...	8.5	9.8
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	10.4	...	8.5	9.8

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax, Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)
Dealer Prices

	Red Crown Cons. T.W.	Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	10.9	8.9	8.4	4.5	10.6
Decatur, Ill.	10.0	8.5	8	4.5	9.8
Joliet, Ill.	11.9	9.6	8.5	4.5	10.6

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect Feb. 1, 1943 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	10.7	9.2	9.1	4.5	10.4
Indianapolis, Ind.	11.6	9.7	9.6	5.5	*10.1
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.9
South Bend, Ind.	12	10.5	10	5.5	*10.5
Detroit, Mich.	11.4	9.9	9.4	4.5	9.9
Grand Rapids, Mich.	10.8	9.3	8.8	4.5	9.9
Saginaw, Mich.	11.4	9.9	9.4	4.5	9.9
Green Bay, Wis.	12.2	10.7	10.2	5.5	10.9
Milwaukee, Wis.	12.1	10.6	10.1	5.5	10.8
La Crosse, Wis.	11.9	10.4	9.9	5.5	10.6
Minneapolis-St. Paul	11.9	9.9	9.5	5.5	10.6
Duluth, Minn.	12.2	10.7	10.2	5.5	10.9
Mankato, Minn.	11.9	10.4	9.5	5.5	10.6
Des Moines, Ia.	11.4	9.9	9.4	4.5	*10.1
Mason City, Ia.	11.7	10.2	9.7	4.5	*10.4
St. Louis, Mo.	10.3	8.8	8.6	*4.5	10.1
Kansas City, Mo.	10.4	7.9	6.9	*4.5	9.7
St. Joseph, Mo.	9	9	8	*4.5	9.7
Fargo, N. D.	12.9	11.4	10.5	5.5	11.6
Huron, S. D.	12.3	10.8	10.3	5.5	11
Wichita, Kans.	9.7	8.2	6.5	4.5	8.3

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7	4.5
Milwaukee, Wis.	15.9	5.5
Minneapolis, Minn.	15.7	5.5
St. Louis, Mo.	15.2	*4.5
Kansas City, Mo.	14.8	*4.5
Fargo, N. D.	16.7	5.5
Huron, S. D.	16.1	5.5

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
	(Prices are base prices before discounts)			
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo.	13.3	14.3	13.8	1.5
St. Louis, Mo.	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'lis	14.2	15.2	13.5	5.5

Fuel Oils T.W.
Chicago

	Standard	Heater Oil
1-99 gals.		9.3
100-149 gals.		8.3
150 gals. & over		7.8

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.8	8.8
100-149 gals.	7.8	7.8
150-399 gals.	7.8	7.8
400 gals. & over	7.3	7.3

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals.	8.3	8.3
100-399 gals.	7.3	7.3
400-749 gals.	6.3	6.3
750 gals. & over	5.55	5.55

	Stanolex Bunker C Fuel Oil
1-399 gals.	6.8
400-999 gals.	5.8
1000 gals. & over	4.8

Other Points Indianapolis	Stanolex No. 1	Stanolex Furnace Oil
1-99 gals.	....	*9.0
100 gals. & over	....	*8.0
Detroit		
1-99 gals.	....	8.1
100 gals. & over	....	7.1
Milwaukee		
1-99 gals.	....	9.0
100 gals. & over	....	8.0
Minneapolis		
1-99 gals.	....	8.8
100 gals. & over	....	7.8
St. Louis		
1-99 gals.	8.6	8.1
100 gals. & over	7.6	7.1
Kansas City		
1-99 gals.	....	7.9
100 gals. & over	....	6.9

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 4c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

S. O. Nebraska

(*Regular Grade*)

	T.W. Dealer	Gasoline Taxes	Kerosine T.W.
Omaha	11.4 8.9	6.5	10.1
McCook	10.5 9.4	6.5	9.3
Norfolk	11.9 10.4	6.5	10.6
North Platte	11 9.9	6.5	10.3
Scottsbluff	12.4 9.5	6.5	9.8

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La.	8.75	9.25	8.5	*9
Baton Rouge, La.	8.75	9.25	8.5	*9.5
Alexandria, La.	8.75	9.25	8.5	*9.5
Lafayette, La.	9	9.5	8.5	*9
Lake Charles, La.	9	9.5	8.5	*11
Shreveport, La.	8.5	9	8.5	*8
Knoxville, Tenn.	9.5	10	8.5	12.5
Memphis, Tenn.	8.90	9.40	8.5	10.5
Chattanooga, Tenn.	10.5	11	8.5	11
Nashville, Tenn.	10.5	11	8.5	10
Bristol, Tenn.	10.95	11.45	8.5	13.1
Little Rock, Ark.	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax.
Discounts:
Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Humble Retail	Thriftane *Tank Wagon	Thriftane Retail	Gasoline Taxes
Dallas, Tex.	6.5	9	4.5	6.5	5.5
Ft. Worth, Tex.	6.5	10.5	6	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Retail
Dallas, Tex.	7	11
Ft. Worth, Tex.	7	11
Houston, Tex.	8	11
San Antonio, Tex.		10

	Tank Car
73 Oct. Aviation Gasoline	
FOB Baytown, Tex.	8.5

*To all classes of dealers & consumers.

The Texas Co.

	Gasoline—Dealer T.W. Fire-Chief (*Regular*)	Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	6.5	5.5	5.5
Ft. Worth, Tex.	6.5	6.0	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition).

	Conoco Bronz-z-z (*Regular*) †Tank Wagon	De-mand (*3rd Grade*)	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	10	9	*7	9.5
Roswell, N. M.	9.5	8.5	*7	9
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.
†To consumers & dealers.

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Standard Posted Retail	Flight Posted Net Tank Truck	Flight Posted Retail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal.	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz.	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore.	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal.	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz.	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.5
Seattle, Wash.	13	6.5	13.5
Spokane, Wash.	13	6.5	16.5
Tacoma, Wash.	13	6.5	13.5

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.
Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 4c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.
†To divided & undivided dealers.

Tank Wagon Price Changes

(These changes have been made in price tables)

Socony-Vacuum Oil Co.—Kerosine price at Plattsburg was cut 0.2c for yard and 0.7c for t.w. Boston reported a raise of 0.2c for yard and 0.5c for t.w., effective Dec. 29.

The Texas Co.—Dallas shows an increase of 1c for Indian gasoline, effective Jan. 16.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

Dormant Equipment can Work or Fight - -

IF YOU CAN'T FIND A USE FOR IT, *Scrap it!*

WAR-OIL EQUIPMENT EXCHANGE

For Sale

Late Model Fruehauf semi trailer, 4 compartment, 3750 gallon. Ford tractor, 2 speed axle, 1942 model with 30,000 miles. All good tires, A-1 condition. $6150.00. Twin City Oil Co., P. O. Box 85, Lakeville, Ind.

FOR SALE—70 H. P. oil-field-type boiler and boiler equipment. Also, valves, both galvanized and black iron pipe and fittings in sizes ½" to 2". Toledo and Howe scales. Box No. 198.

FOR SALE—Two 19,400 gallon Vertical Storage Tanks 126# x 30 feet high, No. 2 ga. shell in Detroit, Michigan. Address Box No. 200.

FOR SALE

2200 gallon, 5 compartment semi and Chevrolet tractor. Excellent condition, tires almost new, equipped with Westinghouse air brakes. Price $2500.00.

Wolverine Oil Corporation
Lansing, Michigan

4,000 gallon 3 compartment tank semi trailers, also tractors for same, immediate delivery.

The Columbus Truck & Equipment Company
Columbus, Ohio
John Pitz, General Manager

FOR SALE: Two Transport Trucks. Capacity 4182 and 3019 gallons. 41 Ford Tractors. Excellent condition.

P. O. Box 3503
Oklahoma City, Oklahoma

***For Sale*—Rail Oil Plant**
15 - 10,000 gal. tanks, some with coils
In the Heart of Chicago Industry
Most Suitable for Fuel Oils
FELDMAN PET. 544 W. Roosevelt HARrison 3500

FOR SALE

Five 15,000 gallon, two 12,000 gallon vertical gasoline tanks, complete with fittings. One set twin 2" Viking pumps without motor, like new. Two single unit brand new 2" Viking pumps with exp. proof motor, one single phase, one three phase. Eight 2" double swinging joints, four 2" loading valves, other fittings.

Bowen Oil & Equipment Co.,
Bement, Ill.

Position Wanted

MARKETING EXECUTIVE available. Eighteen years experience jobber market, personnel, purchasing. Thorough knowledge distribution, warehousing, transportation problems. Age 41. Married. Outstanding credentials. Box No. 199.

Business Opportunity

Take in partner or sell 2,000 gallon per day motor oil reclaiming plant, with blending and filling equipment, 120,000 storage, near large city in Middle West. Address Box No. 202.

Wanted to Buy

WANTED TO BUY—One 4000 gallon transport complete. Continental Refining Company, Oil City, Pennsylvania.

WANTED TO BUY: A good used four thousand gallon semi-trailer preferably with two or more compartments, with or without tractor. Write Box No. 195.

WANTED

Steel Storage Tanks, from 5,000 to 25,000 gallon. Send full details including dimensions, thickness of plate and best price f.o.b. cars, for immediate sale.

Brill Equipment Company
183 Varick Street, New York, N. Y.

Situations Open

ASPHALT TECHNOLOGIST

Position requires man with technical degree who has had five years experience in the manufacture and blending of roofing and paving asphalts. Location, middle West with medium sized oil company. Our employees know of this advertisement.

Address Box No. 190

REFINERY SUPERINTENDENT

Capable man to take complete charge 4000 barrel skimming plant located Michigan area. Prefer man in position to furnish portion of own crew. Good salary to right man.

Reply Box No. 201
National Petroleum News

PROCESS ENGINEERS

Graduate Chemical Engineer or Chemist with several years experience in refinery or oil field on design and operation of light end equipment. Permanent position. Men employed in war industries will not be considered. Reply must state experience, education, age, draft status and salary expected.

Address Box No. 187

WANTED

Supervisor for chain of Bulk Filling Stations, operating in Ohio and Pennsylvania. Applicant must be 35 to 45 years old, positively sober, reliable, and furnish satisfactory character and employment references. Prefer man with at least three years experience in supervisory capacity of Bulk Filling Station, with schooling in service station sales. Steady position and splendid opportunity for right man.

Address Box No. 193

Professional Services

PHOENIX
CHEMICAL LABORATORY
An Exclusive Petroleum Testing Laboratory
Equipped For All Known Tests & Research in Petroleum Products
3953 Shakespeare Ave., Chicago
Telephone—Spalding 3578

ANTI-KNOCK VALUES
DETERMINATORS
The Gray Industrial Laboratories
Chemists and Engineers
Specialists on Petroleum Products
961-976 Frelinghuysen Ave.,
NEWARK, N. J.
Telephone Bigelow 3-4020

National Petroleum News

Copyright 1943 by The National Petroleum Publishing Co.

Trade Mark Registered U. S. Patent Office

Published every Wednesday by
The National Petroleum Publishing Co.

WARREN C. PLATT, *Editor and Publisher*
V. B. GUTHRIE, *Managing Editor*

Member of Audit Bureau of Circulation and Associated Business Papers Inc.

Publication office: 1213 W. Third St., Cleveland, Ohio, U. S. A. Telephone, CHerry 7672. Cable Address PLATTOIL, Cleveland. Cable inquiries are answered by mail unless subscriber advances sufficient funds in American money to cover our cable costs.

NEWS BUREAUS

New York, 50 W. 50th street, Telephone Columbus 5-1516 and 5-1517.

Washington, D. C., 1034-36-38 National Press Bldg., Telephone, NAtional 3477.

Tulsa, Okla., 904 World Bldg., Telephone, 3-7132.

Los Angeles, 610-A Hillstreet Bldg., Telephone, VAndike 2845.

Chicago, 59 E. Van Buren Street, Telephone, Harrison 5901-2-3.

Subscription rate $5 per year in United States, Mexico and Pan-American Countries; $6.50 in Canada and Foreign Countries. Current copies 20 cents, except special issues; back copies more than two months old 30 cents per copy.

ADVERTISERS' INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions.

American Flange & Mfg. Co. 33
Armstrong Rubber Co
Autocar

Badger & Sons Co., E. B. 31
Blackmer Pump Co. 40
Bowser & Co., S. F.
Brodie Co. Inc., Ralph N.
Buckeye Iron & Brass Works
Butler Manufacturing Co. 22, 23

Champion Spark Plug Co. 25
Cities Service Oil Co.
Continental Can Co.
Crown Can Co.

Ethyl Corp. 1
Erie Meter Systems, Inc.

Farrell Mfg. Co.
Fruehauf Trailer Co
Fleet-Wing Co.
Freedom Oil Co. 40

General American Trans. Corp. 39
General Motors Corp.
Gilbert & Barker Mfg. Co.
Goodrich, B. F.
Gulf Oil Corp. 29

Heil Co.
Houdry Process Corp.

Inland Steel Container Co.

John Wood Mfg. Co.
Johnston & Jennings Co.

Kidde & Co. Inc., Walter 38

McDonald Mfg. Co , A. Y.
Master Electric Co.
Mid-Continent Petroleum Corp. 21
Morrison Bros.

Neptune Meter Co.
North American Car Co.

Pittsburgh Equitable Meter Co.
Platt's War-Oil Communication Services Inside Back Cover
Pure Oil Co.

Republic Oil Co.

Sinclair Refg. Co., Inc.
Standard Steel Works
Socony-Vacuum Oil Co.
Sun Oil Co. Outside Back Cover

Thiokol Corp.
Timken Detroit Axle Co.
Tokheim Oil Tank Co. Inside Front Cover
Truck Parts

Universal Oil Products Co

Venango Refining Co.
Viking Pump Co.

Wayne Pump Co.

PERSONALS

E. F. Underwood

E. F. (Tex) Underwood, Kansas City, Mo., Skelly Oil Co. sales manager, is a busy $64 question and answer man since the 72 hour service station law took effect. He gets calls from every direction over 15 states as he has been chief of the facilities section, PAW for District 2, Chicago, since last November.

"Tex" did not move his family to Chicago, but plans to "commute" between Chicago and Kansas City occasionally for visits with the family.

° ° °

J. G. Jordan, division manager of Shell at Cleveland, was elected chairman of a new Petroleum Club of the Cleveland Chamber of Commerce at the club's initial meeting Feb. 1. The club, organized following meetings of a number of oil industry leaders with Chamber of Commerce representatives, will be an affiliate of the chamber and will act as an effective liaison between the industry and its customers, providing an opportunity to discuss wartime problems of the industry and plan a post-war program, the chamber announced.

Other officers of the club are: **Lester S. Auerback,** district manager of Gulf, vice-chairman; **Stanley Cofill,** president of National Solvent Co., treasurer; **Charles J. Thomas,** Cleveland Chamber of Commerce, secretary.

° ° °

Shell Oil Co. announces several changes in personnel and positions as follows:

Harry Jacobs, assistant sales manager since September, 1940, has been appointed acting sales manager. Mr. Jacobs started to work for the company in 1923.

G. P. Koch, formerly educational instructor in the marketing department, has been named supervisor of employe training in the personnel department.

E. P. Ericson has been granted a leave of absence to work for the PAW. He was operations manager in Shell's Boston division.

C. B. Goodman, operations manager in the Minneapolis division since 1940, has been transferred to Boston to replace Mr. Ericson.

R. L. De Spain replaces Mr. Goodman in the Minneapolis division as acting operations manager. He was formerly operations supervisor in the Chicago division.

° ° °

Dick Hammond, Midland, Texas, oil operator, heads the Midland County committee for celebration of the President's birthday.

J. C. Potter, president of Cascade Refining Co., Salem, Ill., announces the appointment of **H. N. Whitaker** as sales manager to succeed **W. C. McCallion,** who has resigned.

Mr. Whitaker was formerly with The Nebraska Producing & Refining Co., Salem, Nebr., and was a marketer for a number of years.

° ° °

New officers of the West Texas Geological Society for 1943 are **Fred H. Wilcox,** president; **P. D. Moore,** vice-president; and **Dana M. Secor,** secretary-treasurer. They are all from Midland.

° ° °

A. N. Hendrickson, Midland, Tex., president of the Landreth Oil Co., has been appointed chairman of the Midland County Red Cross War Fund Campaign for 1943.

° ° °

W. T. Davis, Louisville, Ky., president of Aetna Oil Co., has been appointed a captain in the Chemical Warfare Division of the U. S. Army, and is now on active duty. Capt. Davis, a graduate of the Massachusetts Institute of Technology, served in the Canadian Army in World War I.

° ° °

Promotion of **J. E. Powers,** Louisville, Ky., to the position of state miscellaneous commodity rationing officer, OPA, has been announced.

Mr. Powers, of the J. E. Powers Oil Co., Louisville, formerly handled gasoline and fuel oil rationing for OPA in Kentucky. His headquarters will be in Louisville.

° ° °

Among 668 Indiana Standard employes who will receive gold service pins during the first 6 months of 1943 are **F. H. Fillingham,** assistant general sales manager in charge of the eastern division and **W. T. Bannister,** Minneapolis, Minn., division manager. Each of these men has served for 30 years.

° ° °

Glenn E. Taylor has been promoted from assistant director to director of ODT's division of inland waterways, succeeding **Edward Clemens** who has returned to the presidency of Campbell Transportation Co., Pittsburgh.

Mr. Taylor has been with ODT since February, 1942. He formerly was district superintendent at New Orleans for the Federal Barge Lines.

° ° °

G. W. Laurie, Philadelphia, Atlantic Refining Co., is the new eastern vice-president of the National Council of Private Motor Truck Owners, Inc. He was elected during the council's 2-day meeting Jan. 19-20. Mr. Laurie succeeds **J. G. Winchester,** New York, New Jersey Standard, who remains a director of the council.

Oil men attending the council's meeting in New York were **E. P. Gohn,** Philadelphia, Atlantic Refining; **V. A. Leslie,** A.P.I.C.; **R. M. Clough,** New York, Shell; **H. V. LeBourveau,** New York, Shell; **H. B. Strachan,** Cleveland, Ohio Standard; **J. W. Boland,** New York, Gulf; **L. A. Carlson,** Pittsburgh, Gulf; **V. E. Dawson,** Baltimore, New Jersey Standard; **T. C. Fraser,** Pennsylvania Standard; **C. D. Healey,** New York, Tide Water Associated; **F. B. Hufnagel, Jr.,** Philadelphia, Sun; **E. W. Light,** New York, Gulf; **A. L. Myers,** Newark, N. J., American Oil and Supply; **C. A. Newland,** Charleston, W. Va., New Jersey Standard; and **G. A. Schwab,** Philadelphia, Atlantic Refining.

° ° °

Latest star added to Sun Oil Co.'s Cleveland division service flag is for Senior Salesman **Harry Wood.**

Mr. Wood, who has been working out of Sun's Cleveland division office for 6 years, enlisted in the Navy on Jan. 19.

° ° °

With newly shined 1st lieutenant's bars, 1st Lieut. **Ralph Rankin** recently paid a visit to the Cleveland office of Cities Service. Lieut. Rankin was formerly wholesale manager of Cities Service's Ohio division.

° ° °

Harold W. Berry, formerly Ohio traffic manager for Cities Service and later assistant to the regional manager, is now stationed in Pittsburgh as a 2nd Lieut. in the transportation division of the U. S. Army.

° ° °

A. D. Nelson of Dallas has been elected chairman of the standing committee on state and local taxation by the Mid-Continent Oil and Gas Assn. Mr. Nelson is tax commissioner for the Magnolia Petroleum Co. at Dallas. **Leo Meyer,** tax commissioner of the Mid-Continent Petroleum Corp. of Tulsa was elected vice-chairman. **A. J. Wells,** tax commissioner of the Carter Oil Co. of Tulsa is retiring general chairman.

° ° °

For the 13th consecutive year, **A. W. (Bones) Wyatt,** geological scout for the Atlantic Refining Co. at Midland, Tex., has been elected president of the West Texas Oil Scout Assn. **Carrol Mitchell,** scout for the Continental Oil Co., was named a vice-president, and **A. A. Jones,** scout for Atlantic Refining Co., was made chairman of the pipeline report committee.

HAVE YOU EVER CALLED CHERRY 7672?

INCIDENTS like this are happening all the time:

—a major oil company executive calls long distance to ask if we can supply him with several thousand reprints of an oil order.

—an oil marketer telephones to ask if we can give him the initials and correct spelling of a WPB official's name, plus his Washington address and telephone number.

Numerous requests come in for price ceiling data; there are numberless calls for information of all kinds . . . by telephone, by telegraph, by air mail, and by postal card.

We appreciate this recognition of the comprehensiveness of our nation-wide oil information services.

Expanding our services further we open 1943 with the introduction of a new service, "PLATT'S WAR-OIL HANDBOOK", a complete directory not only of all oil war agencies at Washington, their personnel, room and phone numbers, but also a directory of the members of all committees and organizations co-operating in the industry's war effort. Price is $1.

Other War-Oil Communication Services are:—

National Petroleum News—General Edition
National Petroleum News—Technical Edition
Platt's Oil Price Handbook
Oilgram Price Service
Oilgram News Service
Oil-Law-Gram Reports

Write us. Tell us what your particular problem is. One of the above services—or a combination of several—may hold the answer. We'll be glad to arrange a free trial so that you can see for yourself.

PLATT'S WAR-OIL COMMUNICATION SERVICES

1213 West Third Street — Cleveland, Ohio

Stop the guesswork

Service Both Automotive and Specification Markets

with SUN *Pre-tested* LUBRICANTS

Supply, service, and sales are the problems today. And there's one way to eliminate a lot of your future troubles — take the guesswork out of buying. Avoid the hazards of hit-or-miss buying! Eliminate the uncertainties of product quality and uniformity . . . insure one source of supply of dependable, pretested lubricants that meet the needs of specification and the automotive market—sign up for Sun's complete line.

With Sun Lubricants, you can meet the demands of these markets today . . . and protect your future sales and profits.

The complete Sun line includes everything from 200 @ 100° Golden to a 150/175 @ 210° Green Cast Red Oil, for the specification market . . . from an SAE 20W Golden to an SAE 70 Red Oil, for the automotive market . . . and more than 60 greases and bases.

To strengthen your supply line sign up with the Sun line. Complete information on request . . . without obligation.

SUN OIL COMPANY • PHILADELPHIA

SUN *Lubricants*

100% Distilled • Pre-tested More Than 70 Times

TECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

Monthly Technical Section Devoted to
REFINERY MANAGEMENT and PETROLEUM CHEMICAL TECHNOLOGY

Volume 35 | February 3, 1943 | Number 5

Large Units of Modern Refinery Construction Promise Flood of Products for War Needs

Despite wartime shortages of many materials, engineers are building towers, furnaces and other processing equipment of new design and larger in size, to achieve high yields of improved products.

Special articles in this issue describe a new 20-story fluid catalytic cracking plant for aviation gasoline materials (**p. R-56**); the design and construction of the largest vacuum fractionating tower on record (**p. R-74**). Special photographs show new types of polyforming and gas reversion plants and coking units (**p. R-92 & R-94**).

° ° °

Move Workers To Essential Tasks With Job Priority Plan

This program of Standard Oil Co. of California is one of several methods described by which refiners are meeting the growing shortage of manpower for vital plant jobs ..... p. R-51

° ° °

Article 3 in ABC Series

By R. L. Wakeman and B. H. Weil

From petroleum will come the raw and intermediate materials for synthetic fibers and coatings for fabrics, these authors state ..... p. R-60

° ° °

New Standards for Refinery And Heat Exchanger Tubes

Emergency provisions are included in the 5 new A.S.T.M. standard specifications to provide the refiner with wider selection of suitable materials ..... p. R-66

° ° °

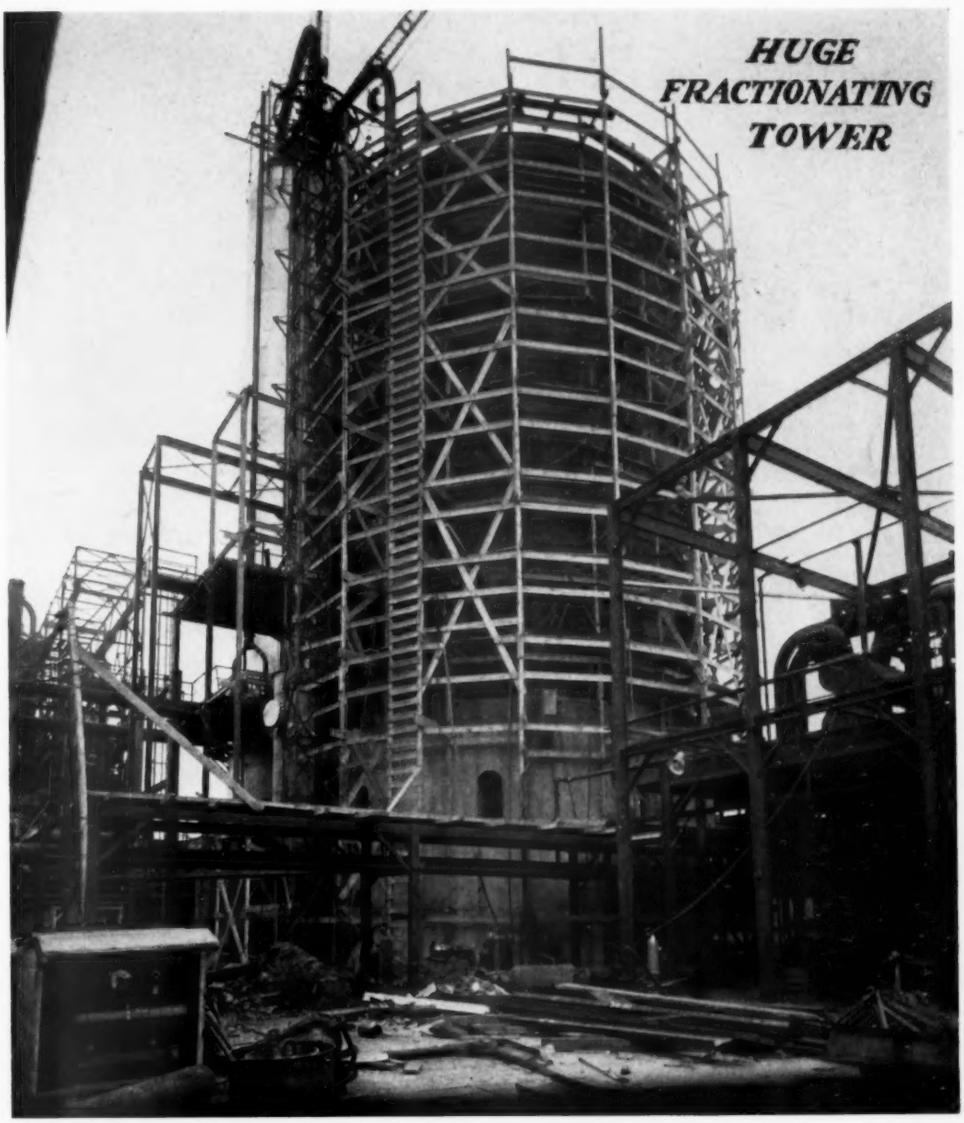
Rules for Conserving Material In Plant Design and Operation

Wartime instructions of Gulf Oil Corp. specify where substitute materials are to be used and call on field force to salvage equipment . p. R-68

° ° °

Treating Residual Fuel Oils To Reduce Ash Content

Practical method by the use of boric acid is developed by Socony-Vacuum Oil Co. for "de-ashing" fuel oils containing sodium salts . p. R-86



As far as is known, this 33-ft. diameter vacuum fractionating tower, under construction when the photograph was taken, is the largest ever to be designed for a petroleum refinery. The tower itself is to be 81.5 ft. high and stands on a 14-ft. concrete base. The figure of the workman just at the left at the top of the ladder helps give an idea of the size of the equipment. The tower was designed to be constructed by arc welding. Special design was also necessary for the trays, vacuum stiffener and other features. For details of design and construction see article starting page R-74

Joseph A. Moller . . . . .

Headed Up Work on Motor Oil Test Method

● The fact that oil company and automotive laboratories now have before them for their consideration a proposed standard method of test indicative of the performance of motor oils in use is due in good part to the work of Joseph A. Moller, Chicago, technologist for Pure Oil Co., until he became a Lieutenant Colonel in the Army Air Corps. He was chairman of the oil group in a special committee of the Lubricants Division of the Society of Automotive Engineers which developed the method of engine test proposed to the American Society for Testing Materials. This test, officially known as "Proposed Method of Test for Oxidation Characteristics of Heavy Duty Crankcase Oils", provides uniform procedure for a test many laboratories had already been conducting independently.

Mr. Moller started with Pure Oil Co. shortly after graduating in mechanical engineering from Cornell University. He was associated with the early development of the company's testing laboratories and was chief products engineer in charge of mechanical research when he left to enter the service.

REFINERY MANAGEMENT *and* PETROLEUM CHEMICAL TECHNOLOGY

February 3, 1943
Volume 35
Number 5

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

Meeting Manpower Shortages In Vital Refinery Jobs

"The manpower problem in our own company is becoming extremely critical, since our plant is located in a highly industrialized area. War plants in the neighborhood work from 48 to 56 hours a week and, with time and a half for overtime, the result is a much larger pay envelope, which is lowering the morale of our own refinery process men and seriously affecting the efficiency of our entire operations.

"Our process men are on a 40-hour week schedule, which fits present plant requirements; yet the men resent their inability to secure overtime such as their neighbors now are earning in war plants. They overlook the fact that our refinery is operated through good times and bad, and that we have kept many of these men on our payroll for years.

"We may find it necessary to rearrange our entire working schedule and go to a 48 or 56-hour week. This is not an economical solution to the problem and will mean adjustments that will be difficult to make to the satisfaction of all the men."

Typical of the seriousness of the manpower problem that refinery management faces today was this comment from an eastern plant superintendent to National Petroleum News for NPN's study of the shortage of workers in refineries and gasoline plants and the methods oil companies are adopting to meet this wartime condition.

Methods of attack on this problem—they can hardly be called "solutions" in most instances—are as varied as the oil companies' approach to marketing and other problems have been in peacetime. They run the gamut from no coordinated program at all for making up the loss of workers into military service and to other industries, to elaborate vocational training plans, the recalling of annuitants, job priorities programs and carefully prepared procedures for requesting draft deferments for essential workers.

Organizes Job Priorities Plan

One of the most highly organized of the oil company methods for meeting the growing manpower shortage from within the company's ranks, is the Job Priorities Program of Standard Oil Co. of Calif. It provides for classifying all company jobs in the order of their importance to its war effort; cataloging the qualifications of the individuals for higher priority jobs and training them and transferring them to more essential work as manpower shortages arise. The program is described later in this article and Table No. 1 lists typical classifications in the 3 job priorities groups.

Following is a general account of the methods oil companies are using to meet the manpower shortage in vital plant jobs, from information secured by personal interviews of an NPN staff writer with plant managers and from data received by correspondence.

Ask Draft Deferments

Most companies are requesting draft deferments for "key men". Their definitions of such classifications vary from only one man—the refinery superintendent—to all men above the grade of boiler-fireman. However, the fact that a man possesses a certain job is not automatically ground for asking deferment, personnel men point out. Rather, length of service, aptitude, training, experience and the availability of a satisfactory substitute to take his place must all be carefully weighed.

"It's our patriotic duty not to ask for any more deferments than are absolutely necessary", one refinery head commented, adding that in his company a number of progressively-higher executives must each consider and approve any request for a draft deferment.

The general list of classifications in which a refinery worker must fall to be considered by most oil companies for deferment includes: Superintendents, all supervisory men on operating units, the two top crewmen on crackers (all shifts), greasemakers and compounders, welders (long experience), electricians (long experience), control instrument men (maintenance and repair), boilermakers, machinists, all technical men (chemists and engineers), and foremen not otherwise covered.

Many companies follow up the formal request for deferment (Selective Service Form

This class in blue print reading and practical shop maintenance is one of 7 vocational training classes for qualified volunteers provided by a Mid-Continent refiner to train employes for greater usefulness. Class enrollment is 18 and the course lasts 8 weeks. Students are regularly-employed graduate craftsmen: carpenters, boilermakers, welders, pipefitters and machinists with 1 to 20 years' seniority

42-A) with letters setting forth in more or less detail why they believe the individual should be deferred. One company's statement points out that refining facilities are more vital than ever due to great and increasing demand for petroleum products by the war effort; that demand is coming from war plants, for vital civilian needs, and for the production and transportation of foodstuffs, all in addition to supplying the needs of the armed forces of the United Nations.

This company goes on to list specifically the wartime petroleum products it is making such as: Aviation gasoline and components, heavy-duty lubricants, toluene for explosives, and butadiene for synthetic rubber among others. In a separate memorandum, it lists its manufacturing department's war production program and how these products are used in the war effort. This is followed by a detailed list of units and processes devoted to war work, together with the current construction program and proposals before WPB and PAW on which government approval and priority has been requested. Attention is called to the increased requirement for technical personnel which the coming on-stream of these new units and proposed units will require.

It also points out that the "skeleton force" of older men not normally considered for military service can keep "regular" production going, but only by maintaining and expanding its technical, development and operating staff for "war products" can the oil companies meet the government's requirements for increased supplies. The statement goes on to point out what steps were taken to meet the manpower shortage without asking for draft deferments.

This company, by the way, has arranged its trained technicians in 3 flexible groups to help overcome a shortage in any particular phase of operating. The groups include development men who work out the new ideas, engineers who apply the ideas of their own and other men to actual plant equipment, and plant supervisors and staff men who put the actual plant equipment into operation and keep it operating at a maximum rate.

This company's statement to the draft board also includes up-to-date statistics showing just how many trained men it has lost to the armed forces, in relation to the total number of employes. The difficulties of securing replacements and men capable of being trained as substitutes are discussed in detail.

'Educating' a Draft Board

Another company, a small refiner, invited the local draft board members to a tour of his plant to show them, first hand, the extreme complications attendant in a refining operation and why it is not possible to take a green hand, give him 6-months' training and turn him loose to operate a cracking still or other phase of the refining operation. The possibility of this green hand killing or maiming others, destroying the plant and reducing by that much the vital petroleum supplies and manpower necessary to the war effort was emphasized. This particular draft board was said to be more considerate of this oil company's request after this bit of "education".

Many companies are not using such elaborate or spectacular methods to present their cases to the draft boards. They simply state the "obvious" facts; namely that the company is engaged in production valuable to the war effort by reason of its manufacture of aviation gasoline or components, codimer, heavy-duty lubricants, fuel oils for domestic and commercial use, and products required for essential civilian use. They then cite the registrant's qualifications for the job he holds, what part that job plays in the economy of the refinery and the difficulties of replacing him.

Appeal Deferment Requests

Many oil company personnel heads with experience in handling draft board appeals say an appeal should always be considered if the local board's ruling is adverse. "If the man is worth deferring, the case is worth appealing," one man expressed it. One draft board was said to have adopted the policy of automatically refusing all deferment requests on the grounds that if the man was worth fighting for the employer would appeal. Another was said to have refused to defer even an admittedly essential man on the grounds that the people of the community were predominantly farmers and would make it impossible for the draft board personnel "to live among these people if we defer him because it will look like we are favoring the big corporations; taking it out on the farmer and the little fellow". This draft board, it was said, advised employers to "let the appeal board settle it".

Can Defer Only 6 Months At a Time

Deferments are granted for periods up to 6 months; longer deferment cannot be granted, according to Selective Service officials, but a deferment may be extended for an unlimited number of times without prejudice, each extension for a minimum of 6 months.

The batting average on draft deferment requests granted refinery workers is high, according to the majority of companies surveyed, estimates ranging from 90 to 100% success.

Replacing by "Up-Grading"

Replacements of drafted men, men "pirated" by "cost-plus war plants", or men who become disabled, is solved by most refiners and natural gasoline manufacturers by the "up-grading system". Briefly, this system provides for training men in subordinate positions (helpers) by advancing them from the labor gang and working them with the man they ultimately will replace. New men hired, except technicians, start in the labor gang.

Contracts with many unions call for this policy being followed on a strict seniority basis, it being the responsibility of the union to see that men are provided with the training and qualifications to "step up". In other plants, it is the policy to post job openings for bids by the men who want the job and consider themselves qualified. The bids are opened—frequently in the presence of union representa-

Table 1—Typical Examples of Work Classification in California Standard's Job Priority Program

Job Priority Group 1

DRILLING CREWS on exploratory wells.

GEOLOGISTS, searching for new reserves.

FOREMEN, ENGINEERS, FIREMEN at pipe line pumping stations.

FOREMEN and OPERATORS at natural gasoline plants.

CREWS of tankships.

STILLMEN and PROCESS OPERATORS, making vital stocks (such as aviation gasoline, industrial fuel oil, etc.)

MECHANICS required in the maintenance of vital production, processing and transportation facilities.

TRUCK DRIVERS transporting products to essential Government agencies and war industries.

RESEARCH MEN and ENGINEERS developing and designing essential new facilities such as plants for toluene, 100-octane gasoline, lube oils for military and war industry use.

Job Priority Group 2

CLERKS, on payroll and essential oil accounting.

GEOLOGISTS, doing well correlation work.

GUARDS and WATCHMEN, protecting against fire or sabotage.

LABORATORY INSPECTORS making essential control tests on vital stocks.

BUYERS, STOREKEEPERS and CLERKS, procuring, receiving and disbursing materials and supplies required in the construction and operation of facilities producing products for war use.

CLERKS, required for the preparation of government questionnaires, tax returns and other mandatory reports.

CLERKS preparing bids for Army & Navy invitations.

LEDGERMEN, maintaining accounts receivable for essential accounts.

SHIPPING CLERKS, handling essential paperwork required to accumulate orders and ship products to Governmental and war industry customers.

Job Priority Group 3

CLERKS, engaged in analytical cost studies, manual work, etc.

GEOLOLGISTS, estimating reserves, water table studies, etc.

MECHANICS, engaged in maintaining non-productive facilities or maintaining essential facilities to a higher standard than necessary for operation.

GAUGERS, GAS MEN, etc., making measurements, tests, etc. for internal accounting purposes.

SALESMEN, promoting and soliciting the general trade.

CHAUFFEURS.

BUYERS and CLERKS involved in the procurement of materials and supplies from the standpoint of securing most favorable price or reciprocity arrangement.

SALES PROMOTION, MERCHANDISING and ADVERTISING SPECIALISTS.

tives—and the man selected on basis of seniority or by reason of training and experience alone when other desiderata are equal.

In the case of positions requiring college-trained men, such as chemists and engineers, many personnel men say there is a very serious shortage. This means scouring the colleges, and other sources for such workers or doubling up the work of the remaining men and dropping what of their work can be spared for the present. Many companies are hiring women for chemists and chemists' helpers.

The colleges are not now regarded as the best source for this case of workers because, first, the men must be taught to convert theories to practice before they can take responsible positions and, second, most of them are "draft-board meat" because of their age and lack of experience. However, one refiner said that he had recently received applications and hired several technical men who had quit their higher-pay jobs with "war-plants" because they wanted to avoid being frozen in these jobs by the Manpower Commission. Skilled workers, such as welders, also were reported to have quit several "war-plant" jobs in succession and gone back to their old employers, but several employers said they were hesitating about hiring such employes.

Work Supervisors Overtime

In many companies the shortage in supervisory personnel is being solved by their working longer hours. In answer to NPN's questionnaire many companies stated that plant managers and supervisors are now working 50 to 60 hours a week (one company said 84). Only few companies, however, reported their plant workmen were putting in much over the normal working schedule of 36 to 40 hours a week. Adopting a practice of making up for the manpower shortage in some departments by providing for the men there to work longer hours would call for readjusting the schedule of working hours per week for the entire plant to maintain harmony, it was said, and would entail considerable overtime pay but, on the other hand, would not result in increased output to compensate for the greater expense.

Job Priorities Program

An effective plan for meeting the shortage of essential workers from within the company organization is the Job Priorities Program of California Standard. Its purpose is to direct the use of company manpower to work of greatest value to winning the war. It was introduced to the company personnel in a letter from President H. D. Collier, which stated in part.

"If we are to maintain our essential operations at the level necessary to meet the demands being placed upon us, many activities that have been justified under normal conditions must be suspended during the emergency.

"The company will shift manpower from activities which we can get along without during the war emergency to fill personnel shortages that might arise in essential activities. This movement will be gradual as the need for men develops in the vital activities of the company".

In this program, company jobs were segregated in 3 Job Priority Groups in the order of their importance as determined by the value to the war effort of the end-use of the products or services produced by the job. As the need for men develops in vital activities of the company, wherever possible men are shifted from jobs of lower priority classifications. The 3 general group classifications are:

Job Priority Group 1—Jobs directly involved in the production of products or services and the maintenance of facilities, the end-use of which is essential to the war effort.

Job Priority Group 2—Jobs involved in the production of products or services, the end-use of which is necessary to the support and continuation of the work of jobs in Group 1.

Job Priority Group 3—Jobs involved in work which, while essential to the company's position or progress in normal times, could be suspended under a rigid war economy without seriously handicapping the physical production of goods or service essential to the war.

Within the third group jobs were subclassified according to their degree of importance to the company's welfare and existence and the jobs are given alphabetical suffixes JP3A, JP3B, etc. In all cases the end-use of the production of the particular job is the yardstick and assignment of blanket priority classifications to all jobs of the same title or nature is not considered satisfactory. Also, the job priority classification once set up cannot remain static, company officials stated, but is a continuing activity requiring changes to adjust work values as changes in the nation's war economy or in government orders take place.

Such matters as scarcity of purchased materials, mandatory limitation orders on certain products, uses or services, new military demands for products or diversion of products from civilian to military use will change the value to the war effort of the end-use of the production of jobs and make necessary revisions in the job priority classifications.

The company's employe relations and personnel department directs the cataloging of individual jobs, and in addition catalogs individual workmen according to their qualifications for performing jobs in the upper priority classifications. It also acts as a clearing house for inter-departmental transfers and formulates and directs the training programs or procedures required to prepare the individual for work of a more essential nature.

Recall Annuitants

A few oil companies who have retirement plans are recalling annuitants or retired individuals where they are both physically able and willing to come back to work. The possibilities here are, of course, limited. One company makes up the difference in pension income occasioned by loss of federal pension, and, in addition, pays a beginner's wage in the job the annuitant does—the annuitant's pension from the company is not changed. Thus, the annuitant's net income is increased, but net cost to the company for his labor is relatively small.

Lower Job Qualifications

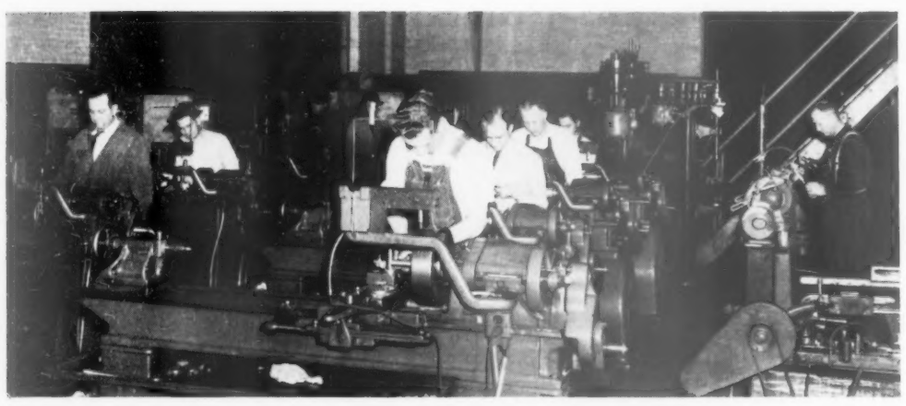
Many companies have "let down" their requirements for new employes, both physical and mental. "Take what we can get" is the

Standard Oil Co. of California's Job Priorities Program, which classifies all company jobs in the order of their importance in its war production effort and catalogs individuals' qualifications for more essential work, transferred this girl to a job driving a small truck which picks up control samples in the Richmond plant for laboratory testing

This 74-year old retired machinist gladly went back into the harness to help a Mid-Continent oil company overcome the growing manpower shortage. He handles a lathe on the night shift in the refinery machine shop

Under the Standard of California's Job Priorities Program, this former service station manager was transferred to a job as carpenter's helper on maintenance work at the Richmond refinery, where his services definitely contribute to the company's wartime program

LEFT—Repairing a pellet machine in the Richmond refinery of Standard Oil Co. of California is this former manager of one of the company's service stations. Under the company's Job Priorities Program he was trained and transferred to work essential in its wartime production program



BELOW—Class in machine shop practice, taught by a refinery machinist, is another of the 7 vocational training classes provided by a Mid-Continent refining company for qualified volunteers. The class has 17 students, who are machinist's helpers in the plant with seniority ranging from 1 to 11 years

general policy. At least one company is hiring men with hernia for tasks not requiring heavy labor and also cripples for certain tasks which they are able to perform in spite of their disability. This company is now using employes who were found to suffer from epilepsy on tasks where they will not injure themselves or others in the event of a seizure, but it will not knowingly hire an epileptic. Another company has a man over 90 working as a pumper in the plant's water filtration system: still another recently hired a 77-year old man as a laborer on a right-of-way gang. As one personnel man put it, generally the old men think they still can do the work they did when they were younger, but when they try—and fail—they get discouraged and ask for their time. Thus it is important from the company's point of view not to put older men in work which will tax their strength too severely, even when the men ask for such work.

Use Vocational Training

Some oil companies are making extensive use of the government-sponsored program of vocational training classes for defense workers by sending new and old employes, as well as foremen and supervisors, to these classes. Often instructors as well as students come from company ranks. These classes were provided for by Congress in 1940 as an extension of the Vocational Training Program first provided under the Smith-Hughes Act of 1917. The present program has 2 aims: (1) to train skilled and unskilled workers for the war production industries and (2) to upgrade skilled and unskilled workers now employed by companies which hold war contracts. It is the latter which is most applicable to oil company workers.

Classes under (1), the "pre-employment training program", train 8 hours a day, 6 days a week, for 8 weeks; classes under (2), the "supplementary training program", receive from 6 to 10 hours training per week for 8 weeks—or any other arrangement that will fit the course requirements, generally 48 clock hours. Under either phase of the program, instructors, equipment, classrooms, and utilities are furnished without cost by the government. Students under (1) may or may not be in the employ of a company; under (2) they must be employed in a plant having a war contract.

The "Vocational Training Program for War Production Workers", according to M. L. Powers, Oklahoma State Supervisor, has prepared 15 manuals of instruction which relate primarily to oil production; all have been validated by the American Petroleum Institute Production Division's education committee. About half of these manuals also apply to refining and have been validated by the A.P.I. Refining Division's education committee. In addition, outlines of proposed manuals dealing with cracking and distillation have been similarly validated to serve until the complete manuals can be written.

Titles of manuals so far validated are: (basic training courses) "Grade Review", "Arithmetic Applied to the Petroleum Industry", "Mathematics Applied to the Petroleum Industry", "Elementary Science Applied to the Petroleum Industry"; (general training courses) "Internal Combustion Engines", "Compressors in the Petroleum Industry", "Steam Power", "Electricity in the Petroleum Industry", "Blue Print Reading and Sketching for the Petroleum Industry"; (special training courses) "Drilling Practices", "Production Practices", "Natural Gas Production", "Manufacture of Natural Gasoline", and "Maintenance and Repair of Mechanical Equipment".

Other courses which are to be prepared include: (general) "Surface Pumps", "Story of Petroleum", "Oil Field Transportation"; (special courses) "Construction Practices", "Pipe Line Operating", "Petroleum Refining"; (special courses for refining division, operating) "General Petroleum Refining", "Elementary Petroleum Chemistry", "Properties of Oil—Physical Tests and Specifications", "Pumping, Gauging and Sampling", "Light Oil Distillation", "Pressure Distillation", "Manufacture of Lubricants", "Combustion", "Heat Transfer", "Refrigeration". Special courses in practical mechanics, pipe fitting, welding, instrumentation, boiler making, and general construction practice also are contemplated.

Classes for job instructor training—teaching foremen and supervisors how to break a job down into its salient points and how to put these key points over to a green hand so he can learn the job in the shortest possible time—may be arranged for under this program in any given locality where not less than 10 nor more than 12 men are available to take the course. This requires two 5-hour sessions, generally over a 2-week period.

Course instructors must possess the following qualifications: Age, minimum of 24; education, high school graduate; and "practical experience in the line of work to be taught". If a company recommends a candidate, he generally is found to possess more than the minimum requirements, although in some cases where the prospective instructor is over 24 and "long" on the experience requirement, part of the education requirements may be waived. The decisions go on the basis that it is easier and quicker to make a teacher out of a skilled worker than the reverse. Instructors are paid the going wage scale in the locality for the work taught.

This government sponsored training program, especially as it refers to the petroleum industry, has been most strongly developed in the oil producing states of Oklahoma, Kansas, Texas, New Mexico, Arkansas and Louisiana, and to a lesser degree in Illinois and Indiana, according to the Oklahoma supervisor. Supervisors in other states can arrange for such classes, or Dr. L. S. Hawkins, director of training for war industries, U. S. Office of Education, Washington, can be contacted for information and arrangements.

To get such classes started, using Oklahoma as an example, the state supervisor should be contacted (or the local supervisor if known) for the desired course, advising him the number of men considered for training. This usual enrollment is from 16 to 20 men per class, size varying with the type of course, instructional equipment and classroom-size available; the average is 20 for the oil industry. The men must be employed at a job in which the skill

to be taught is applicable. Pipefitters would not be trained to repair and install refinery control instruments, for example, nor a machinist how to lay out heavy boiler plate. If the training is necessary for up-grading, a man would also be qualified to attend. The applicant must give his schooling and training, and his practical experience. These applications then are considered by company and vocational training supervisors, and the training classes arranged. If they wish, a group of men may get together and form a class for themselves without company participation.

Instructors are frequently taken from the ranks of oil companies, since they must be skilled in the work to be taught. One company, for example, expects to start classes shortly which will train its men to operate natural gasoline plants; the instructor will in all probability be a company man.

Five companies' vocational training plans cited below illustrate the general practice today. The classes not under U. S.-sponsored programs frequently have "outside" instructors hired at company expense to avoid paying overtime, which their legal departments have held will otherwise be required.

Company A has government-sponsored classes in blue print reading; machine shop practice; pipe lay-out and fitting practices; welding theory; welding practice; boiler-shop lay-out; instrument repair, installation and maintenance; and an FBI-taught school on sabotage prevention and plant protection. In all classes, safety instruction is a special part of the course—especially in theory classes—with further emphasis during practice. Classes meet on the average of 2 hours per week (theory) and 3 hours per week (practice). Men from the ranks who volunteer and are otherwise qualified by mental ability and leadership are selected to attend safety schools; they receive the equivalent of regular pay for attendance.

Company B, while sponsoring no "vocational" schools, assists such classifications as welders, machinists, and laboratory helpers, among others in securing further education by paying a portion of matriculation fees and costs of textbooks at a recognized school, and arranging hours of work so the man may attend and study for such classes.

Company C also has no vocational training schools for the rank and file. Graduate engineers go through a 2-year training period wherein they work in every department of the company before receiving the permanent assignment for which, in the mutual judgment of individual and company, each is best fitted. This company reports that, due to the current lack of available trainees, this program has been temporarily abandoned.

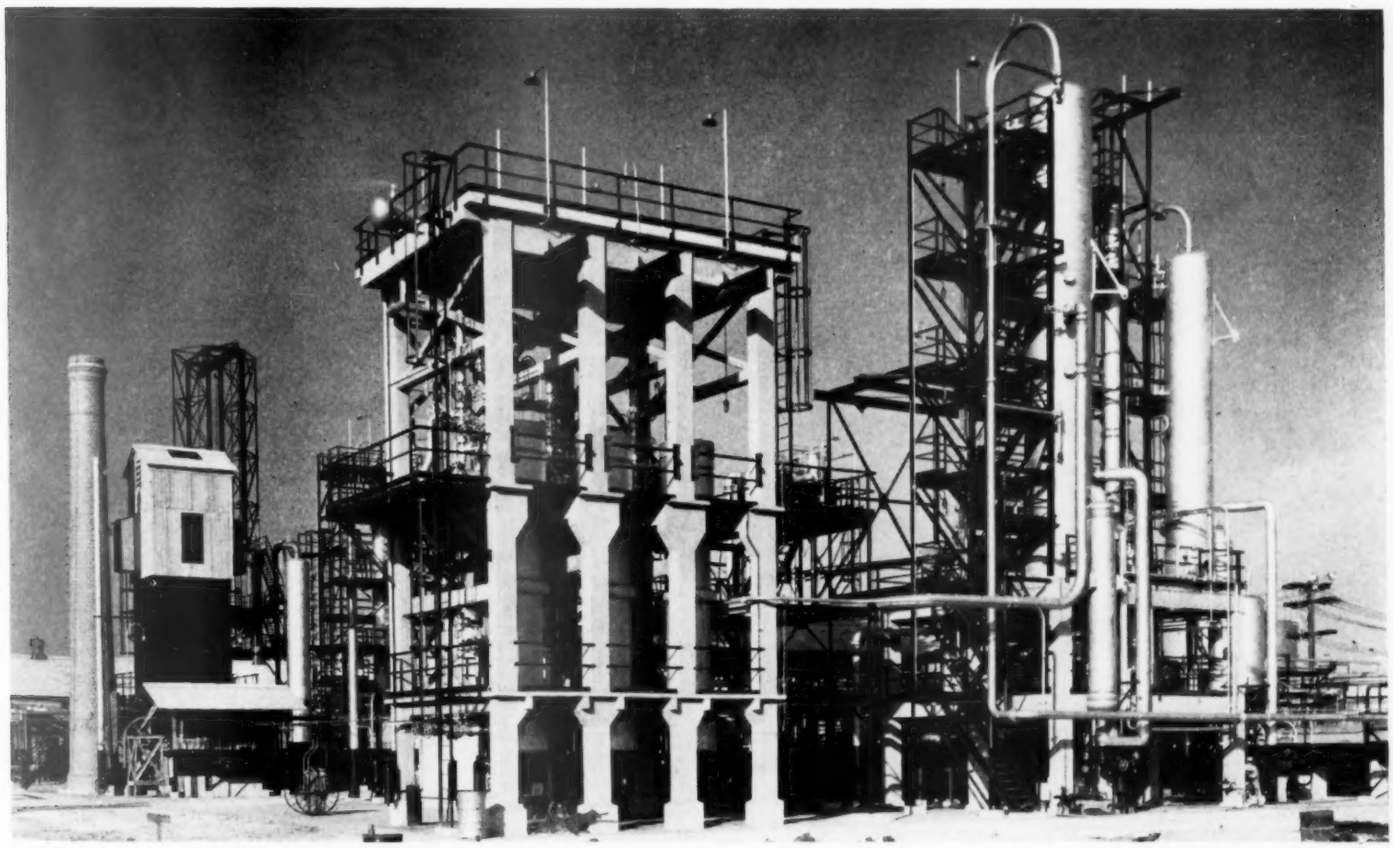
Company D sends all personnel "graduating" from the labor gang through the laboratory as testers. From his work here the man's aptitudes and abilities are determined. Then he is either shunted into the division he best fits for further training, or he is discharged.

Training Staffs for New Units

In setting up and training operating staffs for the new process units which will be coming on stream in coming months, the practice of the oil company is to take experienced men from present plants and train them under the supervision of either the licensors or the engineering firm constructing the unit. Where the units will operate on a process developed within the company, the operating staff is trained under the research and development department men who carried the process through the pilot plant stage.

One company secures the technical and advisory staff for the new unit from among the men in the engineering and development department who brought the process to the commercial stage. Another company asks for qualified volunteers from its operating staff who desire to work in the new unit. Still others send the "keymen" for the new plant to an already operating plant of a subsidiary or "friendly" company for preliminary training. To take the place of the seasoned employes transferred to the new units, their helpers are up-graded wherever possible.

One of First 100-Octane Aviation Gasoline Plants Built in the U. S.



One of the first 100-octane aviation gasoline plants built in this country, completed in 1937. This plant manufactures iso-octane by selective polymerization of butylenes to iso-octene and then hydrogenation to iso-octane. In the foreground is the polymerization unit and in the left background the high pressure hydrogenation unit. The catalyst unit is in the center background and the distillation equipment to the right. (Photo from Lummus Co.)

20-Story Cracking Plant Makes Aviation Gasoline By Fluid Catalytic Method

721.33
751.22

"This huge modern mechanism is a chemical and engineering dream come true."

With these words R. W. Gallagher, new president of the Standard Oil Co. (N. J.) at appropriate ceremonies Jan. 18 at the Bayway, N. J., refinery, formerly declared the company's new giant fluid catalytic cracking unit to be in full operation in the wartime service of the nation.

The 20-story plant, taller than many city office buildings, in addition to providing the means for supplying larger yields of higher quality aviation and motor fuels, was described by the company as a "key for unlocking the tremendous storehouse of chemical raw materials available in petroleum".

"When the petroleum chemist achieves the ability to produce at will the type and amount of hydrocarbons he wants from crude petroleum, there will have been laid the commercial basis for many of the most significant industrial chemical developments in the world to come," it was stated.

The new processing unit at the Bayway refinery is the result of many years of research and experiment by the company's technologists and chemical engineers. It is the first of its type to be built in the eastern seaboard region and has been in operation to some extent since last August.

Its capacity, because of U. S. censorship, cannot be given at present but visitors at the formal opening were told it will handle "hundreds of thousands of gallons of petroleum daily". Two other fluid catalytic cracking plants are now in operation, one in Louisiana; one in Texas. Some 33 units are scheduled for operation in this country.

Yields Ingredients for Many Products

From a charging stock of vaporized gas oil or reduced crude, the process recovers base stock for 100-octane aviation gasoline and the hydrocarbons out of which are made alkylates for aviation gasoline. In addition, the same plant yields a wide variety of other hydrocarbons, including mixtures of ethylene, propylene, butylenes, isobutylene, isobutane, iso-pentane. The first two of these compounds are raw materials for alcohols and the butylenes may be combined with the isobutane to make blending agents for 100-octane gasoline or further processed into butadiene for synthetic rubber. Domestic heating oils are also recovered by this process. Light materials from the Bayway unit at present are used entirely for aviation gasoline.

The man climbing the stair beside the line carrying flue gas and catalyst from the regenerator gives an idea of the size of equipment in the fluid catalytic cracking plant. Largest lines in the plant are 6 ft. in diameter. In the background can be seen a separate unit of the Bayway refinery

The most important development in petroleum refining technology achieved in these new plants of the type built at Bayway is the method for securing continuous operation in catalytic refining. Until recently, catalytic cracking was done by the cycle method in which the oil was reacted with the catalyst, then the cracking operation suspended while the catalyst in the reacting chamber was purged and regenerated. Continuous operations were secured by using a number of catalyst chambers on a synchronized cycle of charging and regenerating.

More efficiency in operation through closer control of temperatures, as well as avoiding heat losses inherent in the cyclic type of operation, are secured by the continuous operation developed in the so-called fluid method of handling the catalyst. This is described as follows:

"In this process the catalyst, in the form of a fine powder, is carried along with the vapors undergoing cracking. After the reaction is complete, the catalyst is separated from the vapors in cyclone separators similar to those used in wood-working plants and sawmills to separate sawdust from air. The coke which forms as a result of the cracking is deposited on the catalyst powder. It is subsequently eliminated by passing the catalyst through a regenerating furnace in which the catalyst is carried by a stream of air which also burns off the deposited coke.

"The important operating advantage of the fluid catalytic process is its complete freedom from mechanical means for moving the catalyst or changing the flow of the cracking or regenerating streams.

"The way in which this is accomplished is novel and noteworthy. The catalyst is used in a finely pulverized form—almost like talcum powder. (This is of importance, incidentally,

since it eliminates the requirement of forming the catalyst into lumps which can stand without deterioration the alternating temperatures of the fixed bed type of operation as well as the abrasion of high velocity gases.) Special type of catalysts are thus available which otherwise would be impractical because of physical limitation.

"The finely divided catalyst is not, in reality a 'fluid'. It is a powder maintained in a fluid turbulent state, by passing through it at all times a certain minimum percentage of some vapor which may be either air, inert gas, steam or petroleum vapor. The consistency of the catalyst thus handled might be compared to the sand just at the water's edge at the seashore which flows readily when supported in part by the water.

"It is a remarkable fact that a properly pulverized solid properly mixed with even a small amount of such vapors attains an extraordinary degree of fluidity and can be handled exactly as if it were in fact a fluid. Thus in the fluid catalyst cracking plants the catalyst is circulated in a manner analogous to an air-lift used to pump water out of a well, and the means used for this circulation is the petroleum vapor being cracked or the air used for regeneration or removal of coke from the catalyst.

"In the Bayway plant this finely powdered catalyst is circulated through portions of the unit at the rates of hundreds of tons an hour. And this is accomplished without the use of any mechanical means other than the pumps which initially deliver the oil to the vaporizing furnaces and a blower which delivers air to the catalyst regenerator".

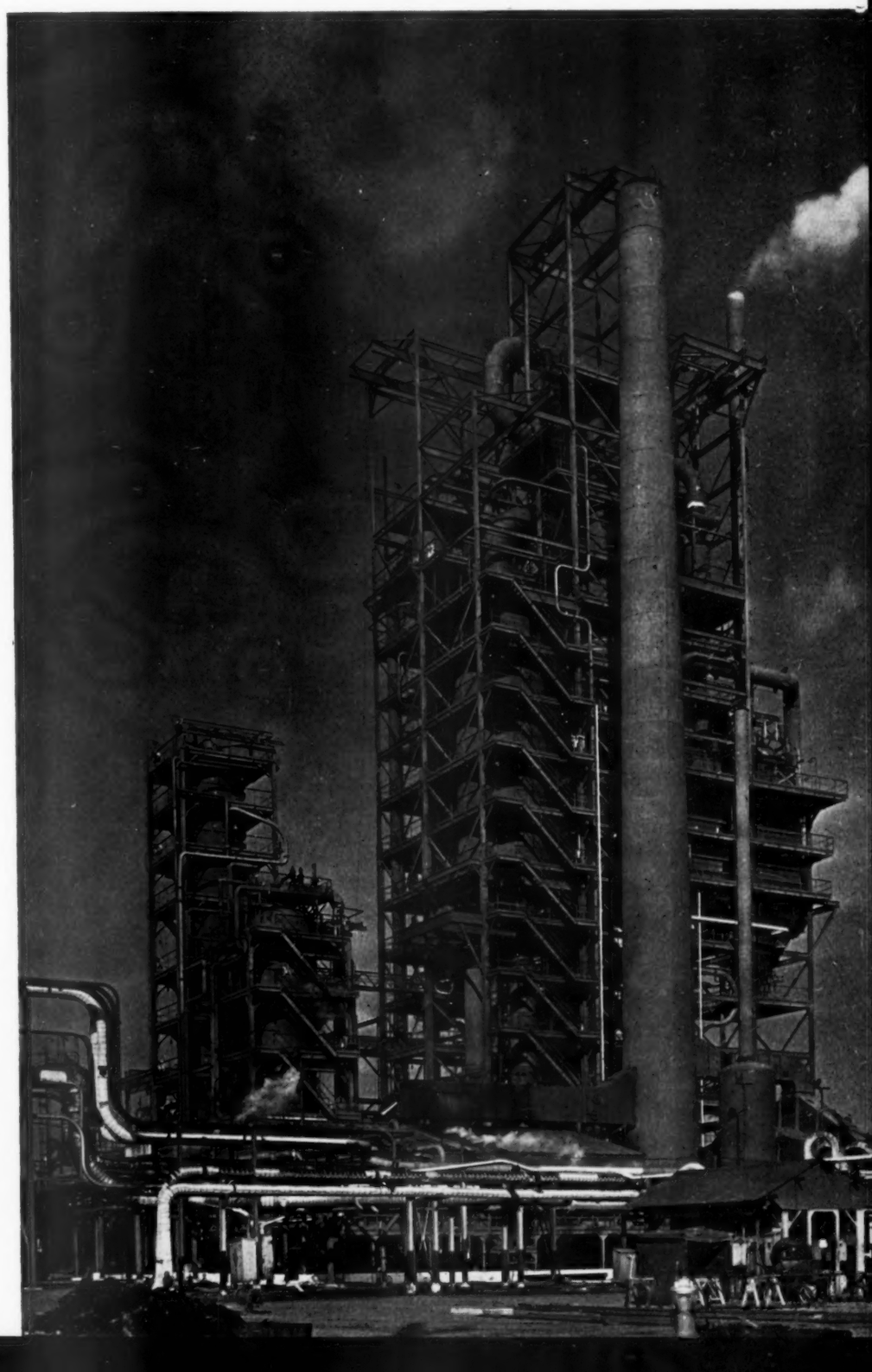
The type of catalyst agent used in the fluid catalytic cracking process is not disclosed at present. A great many, both natural and treated, can be handled in this process, it is stated. The statement is made by the company technologists that it is significant in the war program that the process enables the use of types of catalysts and operating temperatures which would not be possible with other catalytic cracking processes. This permits much greater control over the products produced in the cracking operation.

Describes the Process

The following description of how fluid catalytic cracking works was given by the company:

"The catalyst in the form of a powder as fine as talc is fed into a pipe through which hot vaporized gas oil is pumped under about 10 lbs. pressure toward a reaction (cracking) chamber. This is a steel vessel 15 ft. in diameter by 28 ft. high. Near its hopper-like bottom is a plate with tiny holes in it. The gas oil and catalyst mixture is forced up through the holes. This gives an even distribution of the vapor throughout the reaction chamber. The temperature of the mass is around 800-975°F. The oil vapor and catalyst mixture goes out of the reaction chamber without hesitating. While the actual catalytic action took place in that chamber the mixture (catalyst, vapors and gases) must be processed so that the catalyst, now coated with carbon, is recovered and regenerated while the cracked oil is physically separated into its usable components.

"The recovery of the catalyst is accomplished by passing the entire mixture that came out of the reaction unit through a series of cyclone separators. The gases in the mixture, being under pressure, spin the catalyst around somewhat as snow flakes are whirled around by a high wind. The catalyst particles are forced down through a pipe into a spent catalyst chamber. From this they flow into the regeneration chamber in which the carbon is burned off at 1000-1150°F. in the presence of a stream of air. The burning is continuous



The 20-story fluid catalytic cracking plant located at the Bayway, N. J., refinery of New Jersey Standard. The steel structure behind the stack, 230 ft. long, enclosed the regenerator (left) and reactor (right) of the fluid catalytic unit. The vertical cylindrical vessel in the foreground behind the shed is the blow-down drum for the unit, connected to the oil lines and into which overheated oil can be drawn from any part of the system as a precautionary safety measure. Structure at the left is the first fractionating tower ture at left is the first fractionating tower to which cracked products pass from the catalyst unit. It is nearly 100 ft. high, with one 16-ft. diameter and one 13.5-ft. diameter tower

so long as carbon coated particles of catalyst are fed.

"The catalyst leaves mixed with some gases. To get rid of these, three more cyclone separators and a Cottrell precipitator are used. What the cyclones fail to do in recovering the catalyst from the gases the Cottrell does by its electrostatic precipitation. The cyclones and Cottrell have outlets for clean catalyst which falls into a chamber from which it feeds into a pipe with holes in it. The pipe is always full of catalyst particles so that when air is blown through the holes the catalyst has no chance to pack down tight or form into lumps. The feed down the pipe is by gravity past a valve which controls the amount of catalyst fed to the start point of the system—where the hot or vaporized gas oil line enters the reaction chamber.

"The cracked products separated from the catalyst enter a fractionating tower nearly 100 ft. high with 2 diameters, one 16 ft. and one 13.5 ft. In this tower, fractions are separated as best as can be done in one pass.

"In the first fractionating tower 2 grades of fuel oils are tapped off, one grade collecting in trays on low levels and the other at high levels. The gases and vapors continue on their journey toward separation. These gases and vapors are a mixture of valuable hydrocarbon compounds all of which boil at 400°F. or lower —methane, ethylene, ethane, propylene, propane normal and isobutylene, normal and isobutane, isopentane, and aviation and motor gasoline constitutents.

Can Convert to Butadiene

"At this point or any later on in the process where normal butylene may be fractionated off separately, it may be sent to a de-hydrogenation plant which converts it into butadiene, an ingredient of Buna S and Buna N rubber. Isobutylene, a necessary ingredient of Butyl rubber, if extracted at any desirable point, may be sent directly to a Butyl-rubber plant.

"It should be understood here that in subsequent parts of the process where the same compound seems to divide itself so that some goes in one direction and some in another, it is not possible to make the entire amount of one compound go in one direction all the time.

"This mixture of hydrocarbons pumped from the fractionating tower goes first to a distillate condenser. This condenses propane, propylene, normal and isobutylene, normal and isobutane, isopentane, aviation and other fuel constituents which boil at 400°F. or under. This mixture of liquids, or distillate, is forced into a drum where it collects. Gases and vapors that didn't condense—methane, ethylene, ethane, propylene, propane, and perhaps some normal and isobutane, and normal and isobutylene—leave at the top of the drum and are piped to a gas absorption plant to recover the valuable constituents which can be used separately in commerce or in other refining processes. Some C_3 cut goes along with the other gases.

"The distillate—largely propane, propylene, normal butylene, isobutylene, normal butane, isobutane, isopentane and all other compounds boiling up to 400°F.—is pumped to 2 fractionating towers in series. In the first one the distillate enters at the side.

"The object of the process from here on is to effect further separations to obtain C_5 cut. C_4 cut also C_5 cut (isopentane, normal pentane and C_5 unsaturated compounds). Other separations also are made. The C_4 and C_5 fractions are further processed.

"To get C_5 and C_4 cuts the liquid distillate is divided in the tower into a mixture of C_5 and C_4 cuts which leave at the top with a few other gases, while leaving at the bottom is the C_5 cut, plus aviation and motor gasoline constituents. Those leaving at the top pass through a depropanizer out of the bottom of which pure C_4 is drawn. Out of the top of the depropanizer goes C_3 and the other gases. The C_2 cut may be sent to a plant which makes isopropyl alcohol or the C_3 may be split into propane and propylene. The former, when liquified, is sold commercially as a metal cutting gas and for other uses. The propylene is a valuable aid in making aviation gasoline.

"To separate the C_2 cut from other gases and get pure C_3 requires treatment in another fractionating unit. Then C_3 is sent to an alkylation plant, where it is combined with isobutane to make aviation alkylate. The C_4, however, is normally sent directly to an alkylation plant, but it can be sent to a polymerization plant to be converted into codimer. If the codimer is hydrogenated it becomes technical isooctane, which is used to make some types of 100-octane aviation fuel.

"But, to get back to that second fractionating tower into which the C_5 cut and other compounds were sent from the first tower. In the second tower the mixture is divided into 2 parts—fractions with boiling points of 300-400°F. which go to a motor gasoline plant, and, the C_5 cut and aviation gas constituents which boil up to 300°F. This C_5 cut with hangers-on is one type of aviation fuel base stock with a knock rating of 92 to 97 when it contains 4 c.c. of tetraethyl lead per gallon. But 92-97 knock rating isn't 100 octane fuel. Alkylates, or technical isooctane, are therefore added to produce this super fuel."

Unit Cost $6,000,000

This new unit at the New Jersey Standard refinery cost approximately $6,000,000 to construct. It is 230 ft. tall, but despite its size only 9 men are required for its operation, reflecting its practically automatic working.

The new fluid catalytic cracking plant is only a small part of the Bayway refinery, the average running capacity of which under normal conditions is about 100,000 b/d. It has over 3500 employes exclusive of develop-

THEIR PLANT, TOO! The expressions on the faces of these Bayway refinery men watching the ceremonies at the formal opening of the new fluid catalytic cracking unit show their interest is more than that of merely plant workers. The completion of the new wartime project and putting it on stream at capacity to make aviation gasoline is one way they have had a hand in fighting their nation's war

George H. Mettam, works manager for New Jersey Standard, was a speaker at the opening of the new catalytic unit

ment and technical personnel and in normal times ships approximately 30,000,000-lbs. of products daily, about the capacity of 300 loaded freight cars. The facilities of the plant are now fully dedicated to supplying military and other essential demands for petroleum products.

The refinery although primarily intended for manufacture of gasoline and fuel oils, has in recent years been outstanding in the production of petroleum specialties.

Petroleum specialties currently manufactured at Bayway in substantial commercial quantities include isopropyl alcohol, secondary butyl alcohol, white oils, Paratone, polybutenes, ketones, oxidation inhibitors, fuming sulfuric acid, and other specialties new to petroleum but of large current interest. Most of these were first produced commercially at Bayway. On the grounds at Bayway is located the Stanco plant and many of Stanco specialties, such as Mistol, Flit and other insecticides, pharmaceuticals, cosmetics, and similar products, are manufactured, packaged and shipped from this point.

The Bayway refinery has been outstanding in pioneering important process developments in the petroleum industry. Here are some of the processes developed and installed there in addition to the fluid catalytic cracking process; as listed by the company:

Company Lists Bayway Accomplishments

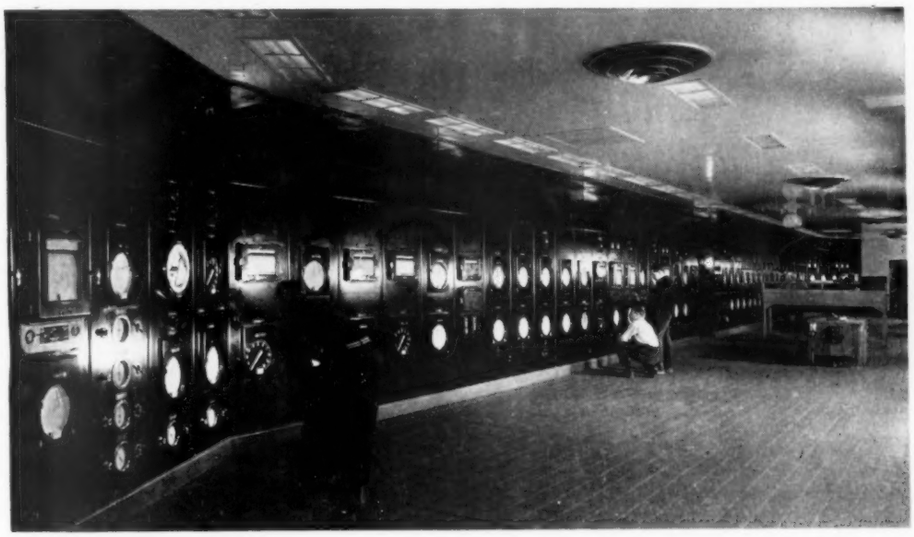
One of the first practical processes for continuous cracking of petroleum under pressure, the so-called "Tube and Tank" process.

A long series of early applications of increasingly higher pressures in cracking, ending with the installation of 1000-lb. "Tube and Tank" cracking coils.

The first continuous vacuum pipe still, which process has been revolutionary in refining particularly for lube oils and asphalts, was developed at Bayway. This unit involved the first furnace in the industry to utilize radiant heat.

At Bayway was designed and installed the first modern plant for commercial fractional separation of the light ends of petroleum. Basically, the knowledge and engineering involved in this unit was the forerunner of present day plants for separating the various constituents now so necessary for 100-octane gasoline and for synthetic rubber. The basic work leading to the fluid catalytic cracking process was conducted at Bayway, where is located the original pilot plant operating in this process.

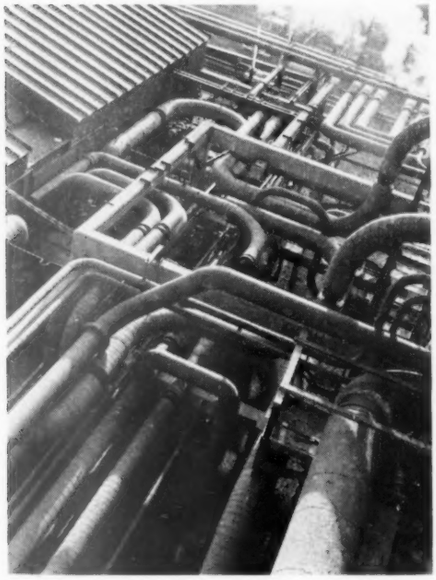
It was at the Bayway refinery also, company officials stated, that the commercial manufacture of tetraethyl lead was worked out and the first commercial manufacture of alcohols and ketones from petroleum gases was conducted there. Butyl rubber was developed there, and the pilot plant for its manufacture is located at Bayway. All the experimental work leading up to and the first commercial synthesis of toluene was done there; also, the work on special additives for lubricating oils which the company now manufactures commercially.



The control room in the new fluid catalyst cracking plant. Temperatures, pressures and rates of flow at all points in the system are automatically registered and recorded by instruments and can be changed by a turn of dials on the board. So automatically does the unit function that only 9 persons now are required to operate the unit and this number will be reduced when the plant has been broken in

In the foreground are the catalyst hoppers. The catalyst is received in freight cars and transfered by elevators to the top of the hoppers, from which it is fed to the catalytic unit nearby. The towers in the right background are part of an old thermal cracking unit at the Bayway refinery

In the rear of the catalyst and oil lines are the cyclone separators in which the recovery of the catalyst is accomplished. The gases in the mixture coming from the reaction unit, being under pressure, swirl the mixture, and the catalyst particles are forced through a pipe down into a spent catalyst chamber



This maze of pipes contains gas oil or reduced crude which is heated before it enters the fluid catalytic cracker in a vaporized state

ABC of CHEMICAL DERIVATIVES from PETROLEUM

III. Textile Fibers

and

Finishing Agents

By R. L. Wakeman[1] and B. H. Weil[2]

Cellulose acetate rayon continuous filament and staple fiber in skeins and on cones; used now for such warlike applications as cloth and support lines for parachutes. Staple fiber, blended with other fibers, produces fabrics ranging in textures from as soft as camel's hair to as rough as tweed. Huge quantities of the acetic anhydride and acetic acid required for cellulose acetate production now are derived from petroleum hydrocarbons such as propylene and ethylene. (Celanese Corp. of America)

ONCE upon a time—22 years ago, to be exact—there lived in Boston a renowned chemical engineer who didn't believe all that he was told. His name was Arthur D. Little. For generations his forebears had been saying, "You can't make a silk purse of a sow's ear." *Can't*, however, was not in his vocabulary. Indeed, he hated the word. So he set himself to it and fashioned a beautiful silk purse in blue from a hundred pounds of porcine ears, warranted to have come from sows by the Chicago slaughter house that supplied them.

In Mr. Little's words, "This making of silk purses of sows' ears was merely a diversion of chemistry at play. When chemistry puts on overalls and gets down to business, things begin to happen that are of importance to industry and commerce." So it has been with man-made silk. Remarkable indeed has been the establishment of today's vast textile industries founded, not upon the limited sppplies of sows' ears, but upon such almost inexhaustible raw materials as tree trunks, coal, and petroleum!

Natural Fibers

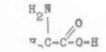
Such natural fibers as silk, wool, cotton, and linen have long been known to man—at first in crude forms, then progressively in more delicate fabrics that finally attained perfection in the prized silks of Marco Polo's Orient, fine woolens of XIIIth Century Spain, renowned tapestries of Gobelins, precious silks and velvets from the looms of Lyons and modern high-grade English tweeds and Irish linens.

These fibers and numerous other coarser ones, such as hemp, jute, sisal, and kapok, all occur naturally as filaments whose strength is remarkable in relation to their size. Chemically, all these materials can be classified in two general categories. Those found in the vegetable kingdom are cellulosic in composition; those occuring in the animal domain are proteinic.

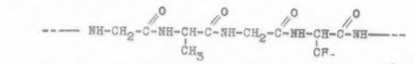
Cellulose[3] contains only carbon, hydrogen, and oxygen. It is a carbohydrate built up by polymerization of many molecules of the simple sugar, glucose, which also constitutes half of the molecular structure of cane sugar. Cellulose varies somewhat, depending upon its source. Such variations can, in part, be accounted for by differing degrees of polymerization, which in turn, are reflected in the physicial properties of the different kinds of vegetable fibers. The number of carbon atoms in a single molecule of cellulose has been estimated to lie between 1200 and 15,000.

By contrast, silk and wool of the animal kingdom are composed of proteins (like sow's ears, too) and contain nitrogen in addition to carbon, hydrogen, and oxygen. Small amounts of sulfur and phosphorus are also present. Proteins are high molecular weight condensation polymers[4] of so-called α-amino acids. Acidity in organic compounds is usually attributable to the grouping

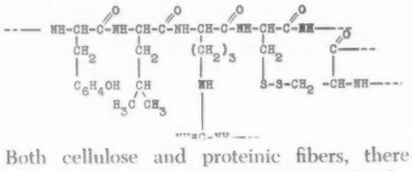
known as the carboxyl radical. The α-amino acids are characterized by the presence of nitrogen (as amine,-NH_2) on the carbon atom adjacent to the carboxyl. Many α-amino acids occur in proteins the simplest one being glycine,



A portion of the structure of silk fibroin is given below, although not all of its component α-amino acids are shown:



A small and incomplete section of a molecule of wool protein, still more complicated, can be presented as follows:



Both cellulose and proteinic fibers, therefore, are composed of very large molecules, more or less linear in character.

Semi-Synthetic Fibers Derived from Cellulose

Among the natural fibers used in making garments silk has always been highly prized because of its combination of sheen and strength. Expense of production and fabrication re-

[1] Pittsburgh Equitable Meter Co.'s Industrial Fellowship, Mellon Institute, Pittsburgh, Pa.

[2] Chemistry Division, Gulf Research and Development Co., Pittsburgh.

[3] The structure of a portion of the cellulose molecule has been shown in the first article of this series, NATIONAL PETROLEUM NEWS, Technical Section, 34, R-416 (1942).

[4] For an explanation of chemical terms used in this paper, see the first article of this series.

stricted its general utilization and long made it the envy of the less fortunate. For many years before anything was known of its chemical construction, men had studied the habits of the silkworm and tried to imitate it without success. Microscopic examination revealed that, whereas the surface of wool and cotton fibers is rough, that of silk is smooth because it is extruded from the body of the silkworm as a viscous fluid which rapidly hardens in the air, yielding a homogeneous, continuous filament of uniform cross-section. The obvious way to duplicate this feat of nature is to extrude a viscous liquid through a tiny hole in such manner that it will harden upon striking the air. The principle is simple enough, but what should be used for a liquid? For centuries that was the silkworm's secret.

The earliest successful answer to this perplexing question was an outgrowth of cellulose chemistry, for it was discovered that the luster of silk depends primarily upon the homogeneity, uniformity, and smoothness of the extruded filament, rather than upon its chemical structure. The latter is important insofar as it makes possible the extrusion of a coherent, strong filament, but it does not determine luster.

In 1885, the French Count Hilaire de Chardonnet, pupil of Pasteur and "Father of the Rayon Industry", deposited a sealed document with the Academie des Sciences in Paris in which he described lustrous synthetic fibers made by converting cellulose to nitrocellulose, dissolving the product in alcohol and ether, extruding the solution through a device containing numerous minute holes, called a spinneret, and evaporating the solvent as quickly as it passed through the holes. Although various samples of woven textiles fabricated from this "nitro-silk" at once attracted popular attention, its inflammability militated against general acceptance for several years. Subsequently it was found possible to remove the nitro ($-NO_2$) groups, thus chemically regenerating the original cellulose, now in the form of smooth, continuous fibers of uniform diameter. Denitration was accomplished simultaneously with coagulation by extruding the nitrocellulose solution directly into an alkaline bath. This denitrated "silk" was much less inflammable than the earlier product and rapidly gained public favor.

Other methods of manufacturing silk-like fibers of regenerated cellulose were quick to follow upon the discovery of "nitro-silk". "Cupra-ammonium silk" was made by dissolving cellulose in an ammoniacal solution of copper oxide and coagulating the spun filaments in a weak acid solution. "Viscose silk," developed by 3 British chemists, Cross, Bevan, and Beadle, was produced by steeping cellulose from wood pulp in an alkaline solution, then treating it with carbon disulfide to yield a complicated product in which all three substances were chemically combined.

The product was called cellulose xanthate, or, more simply, viscose. Regeneration of silk-like fibers of cellulose was accomplished by forcing the viscose through a spinneret into an acidic bath. Of these 3 methods of producing silk-like fibers by regenerating cellulose from its solution in various chemicals, the first two are now almost extinct, the viscose process being used in preference.

None of the basic chemicals used in the production of viscose is economically derivable from petroleum sources. Regenerated silks, however, were precursors of more recent textiles, in the manufacture of which the petroleum industry provides essential raw materials. It was a logical step from regenerated cellulose to semi-synthetic derivatives of cellulose in which a modified form of this natural large molecule was retained in the extrudent finament. The first derivative of this kind was cellulose acetate. Its earliest preparation was carried out by a French chemist, Paul Schutzenberger, in 1865, but not until the beginning of this century were commercial fibers successfully made therefrom. Even then, seemingly insuperable dyeing difficulties were encountered.

Rayon Makes Its Debut

During World War I, however, a considerable amount of general experience with cellulose acetate was acquired as a result of its use in dope for airplane wings, and soon after the war "Celanese" rayon made its successful debut. Earlier dyeing problems were soon overcome, a fact which permitted enthusiastic popular acceptance of this new textile whose net strength was considerably superior to that of regenerated cellulose.

In brief, cellulose acetate rayon is manufactured by treating cotton linters, often admixed with a minor proportion of wood pulp, with a combination of glacial acetic acid and acetic anhydride. The ripened products is precipitated with cold water, yielding white cellulose acetic flakes, which are washed, dried, and dissolved in acetone. The filtered sirupy solution is forced through spinnerets and coagulated into filaments as it emerges by evaporation of the acetone as it passes through the tiny holes of the spinneret.

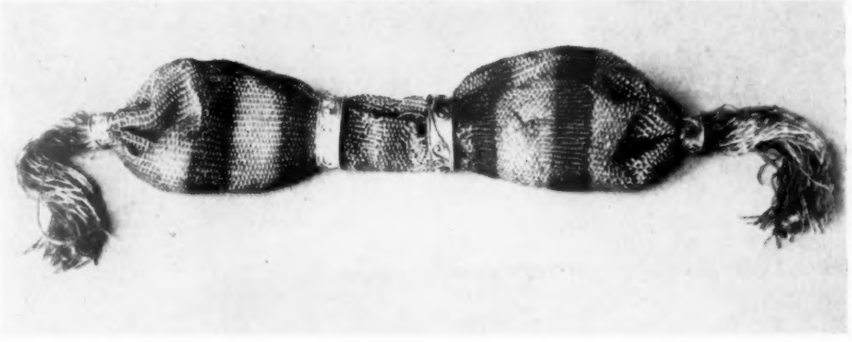
For sometime after the introduction of cellulose acetate, cost was still a stumbling block, for its manufacture entailed the use of large amounts of acetate anhydride, then a relatively expensive compound. Here the chemicals-from-petroleum industry scored an important triumph. It was found practicable to produce acetic anhydride from propylene, a constituent of cracked gases. Other methods have also been developed in recent years for its production from acetylene—a process which may perhaps be related to the petroleum industry of the future through pyrolysis of natural gas or naphthas to acetylene. The propylene process, however, proved to be a startling development, completely upsetting the economics

Petroleum Helps Make *'Silk Purses from Sows' Ears'*

ONE of the new fields in which the petroleum industry is serving the public by supplying raw and intermediate materials for further processing is the manufacture of synthetic fibers and the coating of fabrics with finishing agents for protective and beautifying purposes.

Synthetic fibers became a potential commercial possibility when Industrial Chemist Arthur D. Little in 1921 actually made a silk purse from a sow's ear. It was not long until the possibilities were discovered for using petroleum hydrocarbons in the manufacture of this class of synthetic products. Like many other new processes, this industrial achievement is now largely devoted to supplying materials for prosecuting the war. It holds great promise, however, for wide postwar developments, for which the raw materials will be in great part supplied by oil companies.

Preceding articles in this series in NPN's Technical Section on the utilization of petroleum hydrocarbons in manufacturing chemicals and related products have been: "Synthetic Resins and Plastics", Nov. 25 issue; and "Synthetic Rubbers", Jan. 6 issue. The fourth article, "Solvents and Plasticizers", will be published in the March 3 Technical Section. Other articles to follow will be on "Detergents and Synthetic Lubricants", and "Determining the Individual Oil Company's Part in the Chemicals-from-Petroleum Industry".



Forerunner of the synthetic textiles industry, for which petroleum supplies raw materials, is the famous "silk" purse which Arthur D. Little, industrial chemist, actually made from a sow's ear in 1921, when he was developing processes for the production of artificial silk. (Arthur D. Little, Inc.)

of cellulose acetate production. Water is first added to propylene by catalytic means:

$$H_3C\text{-}CH{=}CH_2 + H_2O \longrightarrow H_3C\text{-}CH(OH)\text{-}CH_3$$

Propylene — Water — Isopropyl alcohol

Isopropyl alcohol thus formed is converted to acetone by oxidation:

$$H_3C\text{-}CH(OH)\text{-}CH_3 + O_2 \longrightarrow H_3C\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_3 + H_2O$$

Isopropyl alcohol — Oxygen — Acetone — Water

The next step is one which had been known in the laboratory for years, but had been deemed impractical for commercial operation. Pyrolysis of acetone leads to the formation of ketene:

$$H_3C\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_3 \longrightarrow H_2C{=}C{=}O$$

Acetone — Ketene

Ketene reacts with acetic acid to yield acetic anhydride:

$$H_2C{=}C{=}O + H_3C\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH \longrightarrow H_3C\text{-}\overset{O}{\overset{\|}{C}}\text{-}O\text{-}\overset{O}{\overset{\|}{C}}\text{-}CH_3$$

Ketene — Acetic acid — Acetic anhydride

In 1935, acetic anhydride sold for about 16c per lb. By 1940, largely as a result of the introduction of the process just described, its price had dropped to the vicinity of 10c. Acetic acid, as well as acetic anhydride, is required for the production of cellulose acetate, and considerable amounts of this chemical are also derived from petroleum.

A newcomer to the field of semi-synthetic cellulose is "Ethorayon," spun from ethyl cellulose. It is yet too new for evaluation, but it utilizes ethyl chloride from petroleum sources for its production.

Lustrous threads produced from cellulose have long since disdained the lowly title "artificial silk". The more euphonious name, rayon, is now universally applied and is used for any silk-like fiber derived from cellulose, whether it is semi-synthetic or regenerated. World production of rayons in 1940 exceeded that of wool and was 13 times as great as that of natural silk. In the U. S., rayon output in 1942 is expected to reach the staggering total of 470,000,000 lbs. of continuous-filament yarn, in addition to approximately 155,000,000 lbs. of staple fiber, short fibers from which spun goods are made. In 1941, some 36% of the total American rayon output was of the cellulose acetate variety. The production of this and other high-tenacity rayons is being increased to provide cord in heavy-duty tire manufacture where, it is reported, its use results in longer life of the rubber because of better dissipation of heat. Large quantities of rayon are now going into the production of parachutes used for dropping military equipment and supplies. Considerable amounts are also being allocated by government order to the hosiery industry and for export to Latin America under the Good Neighbor policy.

While the rayon fibers just discussed are as fine as silk, a much heavier extruded monofilament of another cellulose derivative, cellulose acetobutyrate, known under the trade name "Tenite II," has made its appearance within recent years. This semi-synthetic is made in much the same manner as cellulose acetate, except that it requires not only acetic acid and acetic anhydride for its production, but also butyric acid. This chemical,

$$H_3C\text{-}CH_2\text{-}CH_2\text{-}\overset{O}{\overset{\|}{C}}\text{-}O\text{-}H$$

the odoriferous constituent of rancid butter, may be derived commercially from ethylene by a devious route. Cellulose acetobutyrate monofilaments possess a captivating sparkle. Their scintillation causes woven strands to lend themselves admirably to the fabrication of arresting handbags, belts, millinery, evening slippers, and other ornamental trimmings and articles of feminine attire.

Semi-Synthetic Fibers Derived from Proteins

Various attempts have been made to prepare silk-and-wool-like fibers from the cheapest and most abundant of the proteins found widely distributed in nature. Mr. Little's silk purse was fashioned from the gelatin content of sows' ears, but it was made purely "as a contribution to philosophy". In 1936, however, industrial success of such efforts was achieved through Italian production of "Lanital" from milk casein.

Synthetic casein wools, of which this was the first, soon appeared also in Germany under the name "Tiolan," in Holland as "Casolana" and "Lactofil," in Poland as "Polan," and in England and elsewhere under a variety of trade names. In the U. S., another casein fiber has been placed on the market under the trade name "Aralac". Current production is at the rate of 8,000,000 lbs. annually. Its chief use thus far has been in felt hats, but small amounts have been utilized experimentally in various knit goods.

For the production of wool-like fibers, casein is dissolved in an alkaline solution, then spun and coagulated in an acid bath. The precipitated fibers are strengthened by soaking in a dilute solution of formaldehyde. At this point hydrocarbon derivatives come into play: a portion of our present formaldehyde supply is obtained by direct oxidation of natural gas, and still more will soon be produced by oxidation of methanol derived from natural gas and steam.

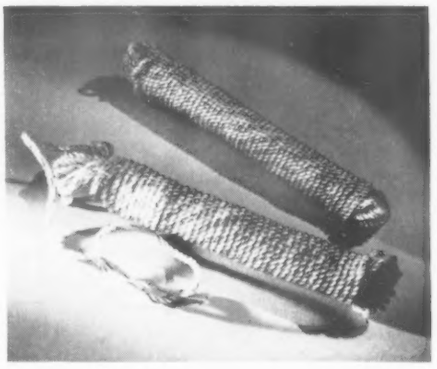
Wool-like fibers have also been made from soybean protein, both here and abroad. Domestic manufacture is still developmental, but small amounts have gone into automobile upholstery. Soybean protein fiber is reported to possess a high degree of durability, rendering it suitable for such heavy-duty applications as topcoats, blankets, and carpets, in addition to upholstery. Here, again, formaldehyde plays a part in after-treatment of the coagulated fibers.

Proteins from peanut meal, corn, and other sources have also been advanced as raw materials for semi-synthetic fibers; none has yet gone beyond the experimental stage.

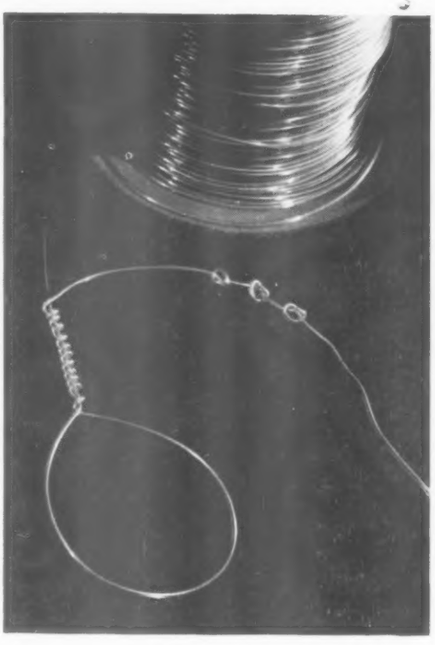
All the fibers thus far discussed are derived from natural substances—either cellulose or proteins. They are, therefore, only semi-synthetic; nature does most of the work in creating their huge molecular edifices. Man only puts on the trimmings, important though they may be.

As the chemist's knowledge of large molecules has increased, he has turned his attention to the preparation of purely synthetic fibers and filaments with notable success. Nylon, "Vinyon", and "Saran" followed each other in rapid succession during the late thirties.

The story of nylon is a saga of scientific research and sound merchandising. The word is a generic term applicable to all so-called polyamides. The amide grouping, which con-

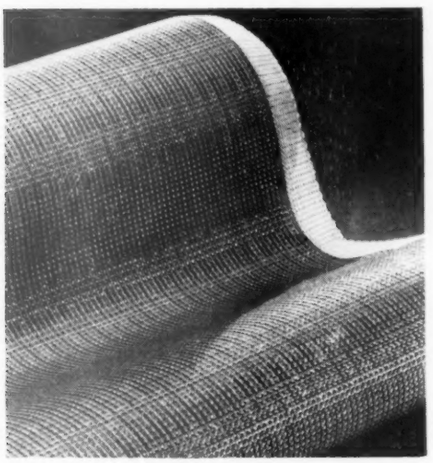


Rope made of extruded "Saran" monofilaments. "Saran" is a recent development made from petroleum hydrocarbons and is expected to find numerous future applications, such as rustproof flyscreen. (Dow Chemical Co.)



"Ethocel" coated wire. This material is produced from ethyl cellulose, which requires as one of its raw materials ethyl chloride, best derived from ethylene from petroleum sources. (Dow Chemical Co.)

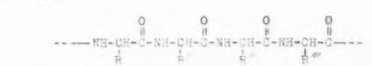
Automobile seat covers of woven extruded "Saran" monofilaments. "Saran" finds application not only in the field of fibers but also as a plastic material in pipes and tubes which are replacing copper in many vital applications. (Dow Chemical Co.)



Fabric woven from "Tenite" monofilaments. "Tenite II" is a thermoplastic molding composition produced from cellulose acetate-butyrate, requiring such petroleum intermediates as acetic anhydride, acetic acid and butyric acid for its production. (Tennessee Eastman Corp.)

tains carbon, hydrogen, oxygen and nitrogen, has the fundamental structure

By reference to the formulas given earlier in this article for the proteins of silk and wool, it is at once apparent that this same group occurs, oft-repeated, in these natural materials, too. A portion of the molecule of these natural fibers may be written, generally, as follows:



where the various R's may be the same or different organic radicals. Polyamides of the nylon type possess a somewhat similar structure, but with characteristic differences evident from their general formula:

In the most important commercial representative of this class, "x" is 6 and "y" is 4, the product being made by reacting together adipic acid,

and hexamethylene diamine,

Both these intermediates are at present obtained from phenol or, ultimately, from benzine. These 2 chemicals, in turn, come from coal tar. Petroleum derivatives, therefore, now play only an indirect role in the synthesis of nylon, but the future gives promise of a closer bond. Petroleum and natural gas hydrocarbons contribute to the supply of ammonia, which is used in the manufacture of diamines, while phenol and benzine, because of military necessity, will soon be produced in part from petroleum fractions—by extraction or by synthesis. Hexamethylene diamine is made from adipic acid, so that benzine can act as the source of both the intermediates used in nylon manufacture.

One of the most interesting steps in the fabrication of nylon fibers is the operation known as cold-stretching. After the molten resin is extruded through the spinneret, it is wound up on a drum from which it is immediately transferred to a second one operating at a higher speed; the fibers are thus stretched to several times their original length. This operation not only decreases the fiber diameter, making possible finer denier than could be extruded practicably, but it also greatly augments their tensile strength. Before stretching, the long chain molecules of nylon are indiscriminately mixed up, like a heap of jackstraws. They might be represented by a multitude of criss-crossed lines.

Cold-stretching obliges them to align themselves in an orderly fashion more or less parallel to each other, so that the molecular aggregation of a segment of a stretched fiber is more nearly symbolized as follows:

This molecular orientation permits inter-molecular cohesive forces to come into play which result in greatly heightened tensile strength. Whereas articles molded from nylon exhibit a maximum tensile strength of about 9000 lbs. per sq. in., that of cold-stretched nylon fibers is over 60,000 lbs. Cold-stretching to increase tensile strength is also carried out with filaments of "Vinyon" and "Saran".

While most of the output of nylon is now going into such military applications as parachutes, the few years which have elapsed since its commercial introduction late in 1938 have seen its enthusiastic reception in hosiery, lingerie, dress goods, neckties, gloves, tapes, dermal sutures, and brush-bristles for a wide variety of purposes, among which the latest use is in paint-brushes.

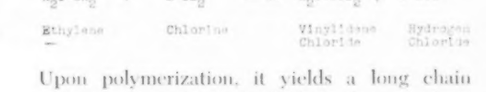
The other two synthetic filaments mentioned above are both derived from petroleum. "Vinyon" is a vinyl polymer, similar in nature to the vinyl plastics described in the first article of this series. It is a copolymer of vinyl acetate and vinyl chloride, the latter constituting some 90% of the whole. Basic raw materials are ethylene, acetylene, chlorine, and acetic acid, all of which, except chlorine, are obtainable from petroleum hydrocarbons. Cold-stretched "Vinyon," like nylon, possesses high tensile strength. In both cases, wet strength is nearly the same as dry. "Vinyon" is odorless, tasteless, does not support combustion, and is permanently water-resistant and mildew-proof. It is unattacked by acids and alkalies at normal temperatures. Its chief limitation is temperature susceptibility, because it has a relatively low softening point which prevents its application in goods which may come in contact with an electric iron. Because of its chemical inertness, "Vinyon" has found important industrial uses in filter cloth. It has also been utilized extensively in felting, where its low softening point can be used advantageously to produce a firm mat. The latter application serves the highly useful purpose of replacing, in part, both rabbits' fur and shellac, now difficultly obtainable.

A new vinyl co-polymer fiber has just been announced which, it is claimed, possesses rubber-like characteristics making it applicable where rubberized textiles, such as "Lastex", have been used before.

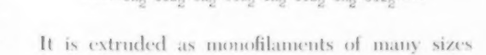
Another type of vinyl fiber was introduced in Germany a few years ago under the name, "Pe-Ce". Up to the outbreak of the current war its principal applications had been in filter cloth. Little is known of its chemical nature, but it appears to be made by polymerizing vinyl chloride and subsequently further chlorinating the polymer.

"Saran" is a polymer of vinylidene chloride

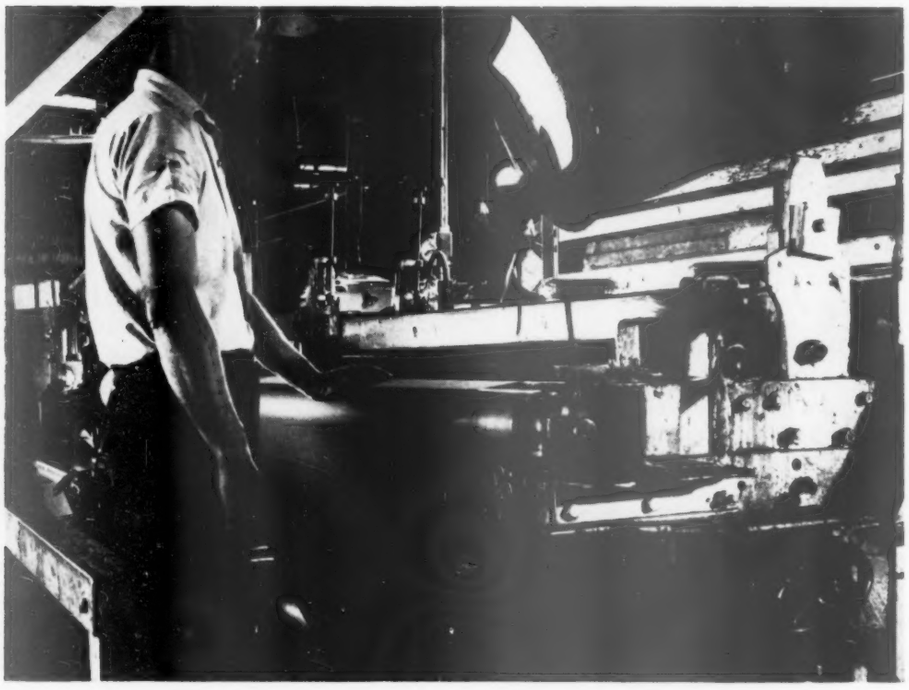
which is produced from ethylene, the overall reaction being as follows:



Upon polymerization, it yields a long chain molecule, a portion of which is shown below.



It is extruded as monofilaments of many sizes from which woven fabrics can readily be produced. Remarkably beautiful in appearance, tough, strong, durable, flexible, abrasion-resistant, and immune to destruction by soaps, oils, moisture, and most chemicals, including many organic solvents, "Saran" fibers are confidently expected to find widespread future use in draperies and in such feminine accessories as belts, shoes, handbags, and millinery. Important applications have already been made in upholstery, sporting goods, and non-metallic window screening. Despite their youth,



A step in the manufacture of "Fabrikoid", a lacquered fabric produced by spreading many coats of cellulose nitrate (pyroxylin) base compositions on a cotton base fabric and driving the material into the weave. It is tough and strong, yet soft and pliable, thoroughly waterproof and highly resistant to flexing and wear. It is used for luggage, upholstery, bookbinding and analogous products. (du Pont Co.)

Nylon flake pours from the hoppers in one of the new plants built for its production. The flake, or chips, are made by chopping the long, ivory-appearing strips that are extruded after the process of polymerization has been completed. The flakes are melted and the molten material again extruded in filament form. Nylon flake is also shipped for use in the manufacture of brush stock, electrical insulation, and other products. (du Pont Co.)

"Saran" filaments extruded in the form of rattan are already nearly commonplace in upholstered seats of buses, street cars, and subways.

A few other synthetic fibers derived from petroleum have been announced but have not yet reached commercial production. Polystyrene, coming from benzene and ethylene, has been extruded as monofilament, while polyisobutylene[5] has been fabricated into resilient textiles possessing characteristics like those of "Lastex". This much-lamented casualty of the war is made from rubber latex forced through a spinneret into a coagulating acid bath, vulcanized, and covered with fibers such as cotton, wool, silk, or rayon to yield a yarn which can be woven or knitted. It is probable that, after the war, not only polyisobutylene but also other synthetic elastomers derived from petroleum will be utilized in the manufacture of similar fabrics.

Coated Fibers

Resin-coated fabrics are well known. "Koroseal" cloth and alkyd-coated goods resembling oiled silk and oilcloth, sold under a variety of trade names, are typical examples. So also is "Revolite" phenolic resin-coated cloth used, for example, in upholstery and laundry roll covers. In another product, "Fabrikoid", coatings of cellulose nitrate base lacquers upon suitable fabrics produce a tough, durable, flexible material, useful for upholstery, bookbinding, luggage, and analogous products. Processes have been developed for coating natural and synthetic fibers and yarns with various synthetic and semi-synthetic resins.

In such an operation a page has been taken from the notebook of the electrical insulating industry, for alkyd resins, polyvinyl formal, and ethyl cellulose are commonly used as wire coatings. Polyvinyl formal, known under the trade name "Formvar", is used in making "Formex" magnet wire. It is similar to polyvinyl butyral, formerly utilized as the interlayer in safety glass. The formal comes from polyvinyl alcohol or polyvinyl acetate by reaction with formaldehyde. Ethyl cellulose, marketed under such names as "Ethocel", is derived in part from petroleum. Considerable quantities of ethyl chloride, an essential intermediate, are produced from ethylene by addition of hydrogen chloride:

$$\underset{\text{Ethylene}}{CH_2{=}CH_2} + \underset{\substack{\text{Hydrogen}\\\text{Chloride}}}{HCl} \longrightarrow \underset{\substack{\text{Ethyl}\\\text{Chloride}}}{CH_3{-}CH_2Cl}$$

One of the most interesting developments in the field of coated fibers is "Plexon", produced by extruding a coating of cellulose nitrate, acetate, or acetobutyrate—or some other transparent resin—over fibers or yarns of many kinds, including cotton, rayon, nylon, and glass. These plastic-coated yarns are resistant to water, grease, and perspiration. They have attained popularity in belts, suspenders, handbags, and upholstery, while resin-coated wire is used in costume jewelry. Finishes ranging from dull matte to a brilliant gloss are available in transparent, translucent, or opaque varieties.

Resinous Finishing Agents

During the past decade there has been a remarkable development in the use of synthetic and semi-synthetic resins as finishing agents for all kinds of fabrics. For this purpose the textile industry makes use of the same general types of resins as are employed for other applications, such as molding, but special modifications of them have been developed specifically for fabric treatment. The finished cloth may contain from one to 30% of various resins, formulated in order to waterproof, to decrease slippage or shrinkage, to improve strength, luster, or resilience, to prevent creasing, or to give improved feel. These fabrics differ from resin-coated textiles in that the original appearance, is retained; porosity, flexibility, and serviceability are unaltered in general. In most cases they look and feel much like the original untreated goods, although by resin treatment it is now possible to vary greatly the qualities of a given fabric. The volume of resins now used as finishing agents is considerably in excess of the amounts formerly employed for cloth-coating only.

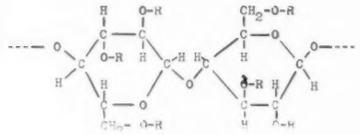
The earliest application of this category was the use of urea-formaldehyde resins for anti-creasing. Fabrics are treated with aqueous solutions or emulsions of urea resins in various stages of condensation, sold under such trade names as "RHonite". The final curing is carried out by heating the fabric, whereby a thorough impregnation of the textile with heat-cured resin is obtained, rendering it resistant to wrinkling, creasing, and crushing. Wrinkles which develop in normal use can be shaken

[5] For a discussion of this material and of other elastomers, see the second article of this series, NATIONAL PETROLEUM NEWS, Technical Section, 35, R-24 (1943).

out or hung out in the air. Because bleaching with chlorine sometimes presents the possibility of forming chloramine, which may subsequently tender the fabric, urea resins are usually recommended for colored goods only. More recently, acrylic resins, such as "RHoplex", have been utilized with considerable success for improving the hand of textiles and increasing their abrasion resistance. The acrylics all stem from petroleum, being derived from either ethylene or propylene, found in cracked gases.

Other resins, such as the alkyds, have also been developed for the treatment of textiles to give them a soft and supple hand.

Ethyl cellulose has been mentioned as an experimental fiber and wire coating. Chemically, its essential characteristic is the presence of oxygen- or so-called ether-linkages, —O—, established between the main skeleton of the cellulose molecule and ethyl groups, $—C_2H_5$, introduced as side chains. Several other groups besides ethyl are present in various commercial cellulose ethers. A fully etherified molecule of cellulose can be represented, in small part, as follows:



where R is ethyl or some other suitable radical. In cellulose itself, the positions of the R's are filled with hydrogen atoms, so that, in the unit shown above, 6 hydroxyl groups, —OH, appear. Etherification is brought about by converting cellulose into alkali cellulose upon treatment with caustic, whereby hydrogen atoms are replaced by sodium, the hydroxyl groups becoming —ONa, where Na represents a sodium atom. This —ONa group is reacted with an organic compound containing chlorine, such as ethyl chloride:

$$-ONa + C_2H_5Cl \longrightarrow -OC_2H_5 + NaCl$$

In the general formula shown above, all 6 hydroxyls have been etherified. In practice, such complete reaction is seldom attained. Where only 1 ethyl group, for example, is present, the other 5 hydroxyl groups remain as such, and the resulting ethyl cellulose is alkali soluble; where 2 ethyls are present, it is water soluble; where 4 to 6 occur, it is insoluble in water, but soluble in organic solvents. The third variety, containing 2 hydroxyls or less in the unit illustrated above, is used in molded and extruded plastics. Alkali-soluble and water-soluble cellulose ethers, on the other hand, are employed in textile finishes.

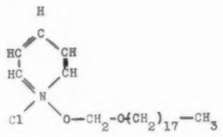
In two of the most important cellulosic finishes, R is methyl, $—CH_3$, or hydroxyethyl, $—CH_2—CH_2OH$, respectively. In preparing the former, methyl chloride, CH_3Cl, is reacted with alkali cellulose. Methyl chloride is now manufactured on a large scale from natural gas by chlorination of methane:

$$\underset{\text{Methane}}{CH_4} + \underset{\text{Chlorine}}{Cl_2} \longrightarrow \underset{\text{Methyl chloride}}{CH_3Cl} + \underset{\text{Hydrogen chloride}}{HCl}$$

In producing hydroxyethyl cellulose, cellulose may be reacted with ethylene oxide,

or alkali cellulose may be treated with ethylene chlorohydrin, $CH_2(OH)—CH_2Cl$, both of which are manufactured in large quantities from ethylene. Methyl cellulose, known for example as "Methocel", is used in printing pastes and as a textile size. Hydroxyethyl cellulose has come into use as so-called permanent finish, "Ceglin" being a product of this character.

A new water-repellent finish invented in England is sold there under the trade-name "Velan". A similar product is now manufactured in this country under the name "Zelan". These materials are not waterproofing resins, but rather they are complicated chemicals which, upon heating of the treated fabric, react with the cellulosic fibers themselves, forming a surface layer of a water-repellent resinous cellulose ether. Stearoxy-methyl-pyridinium-chloride,



a typical representative of these products, is prepared by reacting a fatty alcohol with pyridine, formaldehyde, and hydrochloric acid. Here is an interesting combination of chemicals derived from fats, coal tar, petroleum, and brine, respectively. The production of formaldehyde from natural gas and other petroleum hydrocarbons has been discussed previously. If "Zelan"-treated cotton is heated, stearoxymethyl groups, $CH_3—(CH_2)_{17}—O—CH_2—$, are introduced as some of the R's in the cellulose ether structure shown above.

Another significant advance of recent years has been the improvement of textile printing by use of lacquers instead of printing pastes. This operation differs completely from the well-known method of producing textile prints by the application of substantive dyes. Instead, insoluble pigments are bonded to the fibers by colorless resins, both pigment and resin being deposited by evaporation of organic solvent from the lacquer. New departures in brilliant, stable colors and color combinations have been created by this means. Various plastics derived from petroleum are used in these lacquers.

Miscellaneous Textile Chemicals

Other actual or potential petroleum derivatives find application in the field of textile finishing agents. Glycerol is used as a softening agent for textiles and as a size for silk. Formaldehyde is added to textile sizes to impart mildew resistance to fabrics. Waterproofing of fabrics often is done by treatment with paraffin, mixed waxes, and bituminous materials, such as asphaltum or tar. Water resistance or repellency is given to fabrics by treating with wax or oils dissolved in carbon tetrachloride CCl_4, which is being manufactured in large quantities from methane by higher chlorination than the process previously shown for methyl chloride. Detergents, wetting agents, and emulsifying agents also are being made from petroleum derivatives, but these products will be discussed in a later article. Dyeing agents, and even many dyes themselves, are coming in part from petroleum sources.

* * *

As the molecular engineer has acquired new knowledge of the materials with which he builds, he has developed not only plastics and synthetic rubbers, but also textiles which have improved upon those naturally available. The past and present are but harbingers of things to come. Petroleum and natural gas now take their place beside tree trunks and cotton linters in vying with the silkworm. Where, indeed, is the man who still dares say, "You can't make a silk purse of a sow's ear!"

The Authors

R. L. Wakeman

B. H. Weil

Wartime Standards Are Adopted For Refinery Still Tubes

732.3
734.1
734.2
734.3

NEW standard specifications for grades of steel for refinery still tubes and heat exchanger and condenser tubes have been announced by the American Society for Testing Materials, the scientific organization which sponsors the adoption of standard specifications for materials and methods of testing for the use of industry generally. They are 5 in number, two former standards being dropped.

The 5 new standards provide for a chromium content for tube steels up to 9.5% and they are not based on specific operating temperatures. Where operating conditions involve the handling of a severely corrosive oil, and high chromium content stainless type steels are required, it will remain for specifications to be worked out for the individual cases by the oil company engineers and the steel manufacturer, subject to approval at Washington before the material can be supplied. Refiners are asked to specify such materials, as for all scarce materials, on the basis of not over a 3-year life, rather than normal life for the equipment.

Since the new A.S.T.M. standards include emergency provisions prepared to best meet the shortages in alloy material and certain grades of steel which have resulted from the wartime demand, the authorities which drafted them have recommended to the War Production Board that the emergency provisions be made mandatory in any limitation order it might issue to cover this class of tubular products.

The new standards are the result of a great amount of work by engineers and metallurgists for the steel companies and by the engineers with refining companies who have served on subcommittees of the Committee on Standardization of Refinery Equipment of the American Petroleum Institute. At the head of the oil industry group is D. W. Carswell, chief engineer of The Texas Co. Participating in the work, particularly in the preparation of the emergency wartime provisions, was the Technical Advisory Committee on Steel Tubular Products, National Emergency Steel Specifications, of the War Production Board. Chairman of this advisory committee is T. G. Stitt, chief inspecting engineer, Pittsburgh Steel Co., Allenport, Pa. The objective in preparing the emergency provisions in the A.S.T.M. specifications was outlined as follows by Mr. Stitt:

Objectives Outlined

(a) To establish a minimum list of standard specifications for a given commodity.

(b) To establish a list of the least number of grades of steel which would serve during the wartime emergency.

(c) To recommend such changes in analysis as would tend to conserve critical materials.

(d) To recommend such changes in other features of the specifications as would tend to increase production without detriment to the quality of the material.

"After a thorough study of the existing standard specifications for refinery tubing," stated Mr. Stitt, "the technical advisory committee recommended to the A.S.T.M. that emergency revisions be made in certain of their specifications to accomplish these objectives." The A.S.T.M. promptly took the necessary actions and issued emergency alternate provisions for each of the specifications in question.

"The major changes in analysis made were in respect to critical materials such as manganese, chromium and molybdenum and a comparison of these elements as covered by the emergency provisions with the original analyses will indicate to what extent savings were effected. It was the consensus of the committee that the revised analyses are metallurgically sound and that these steels will prove to be adequate for the duration of the war."

The program for the standardization of still tubes for refinery service and of heat exchanger and condenser tubes resulted in combining the materials for these services into 5 standards, eliminating two former standards for the duration of the war at least. The two standards dropped were A 188-40, Seamless Alloy-Steel (4 to 6% chromium) Still Tubes and A 187-40, Seamless Cold-drawn Alloy Steel (4 to 6% chromium) Heat Exchanger and Condenser Tubes. In each case one type of steel was taken from these standards and included in the emergency provisions of one of the present standards, as shown below.

In the emergency provisions for Seamless

Table 1—Requirements for Chemical Composition, Seamless Low Carbon and Carbon-Molybdenum Steel Still Tubes for Refinery Service

(ASTM A-161-40)

Standard Requirements for Chemical Composition

	Low-Carbon Steel Tubes	Carbon-Molybdenum Steel Tubes
Carbon, %	0.10-0.20	0.10-0.20
Manganese, %	0.30-0.60	0.30-0.60
Phosphorous, max., %	0.04	0.04
Sulfur, max., %	0.045	0.04
Silicon, %	0.25 Max.	0.10-0.50
Molybdenum, %		0.45-0.65

Emergency Alternate Provisions (EA-A761)

	Low-Carbon Steel Tubes	Carbon-Molybdenum Steel Tubes
Carbon, %	0.10-0.20	0.10-0.20
Manganese, %	0.30-0.60	0.30-0.60
Phosphorous, max., %	0.04	0.04
Sulfur, max., %	0.045	0.05
Silicon, %	0.10 Min.	0.10 to 0.50
Molybdenum, %		0.40 to 0.55

Table 2—Requirements for Chemical Composition, Seamless Intermediate Alloy-Steel Still Tubes for Refinery Service

(ASTM A 200-40)

Standard Requirements

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 6	Grade 6
Carbon, max. %	0.15	0.15	0.15	0.15	0.15	0.15
Manganese, %	0.30 to 0.60	0.50 max.	0.40 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60
Phosphorous, max. %	0.030	0.030	0.030	0.030	0.030	0.030
Sulfur, max. %	0.030	0.030	0.030	0.030	0.030	0.030
Silicon, %	0.50 to 1.00	0.50 to 1.00	0.45 to 0.75	0.50 max.	0.50 max.	0.50 max.
Chromium, %	1.00 to 1.50	2.25 to 2.75	1.50 to 2.00	1.75 to 2.25	2.75 to 3.25	2.00 to 2.50
Molybdenum, %	0.45 to 0.65	0.45 to 0.65	0.60 to 0.80	0.45 to 0.65	0.80 to 1.00	0.90 to 1.10

Emergency Alternate Provision (EA-A 200)

Grades 2, 3 and 4 above deleted for the duration of the war.
Type Cr-Mo from ASTM A 188-40 (Seamless Alloy-Steel (4-6% chromium) Still Tubes) added as Grade 8 below.
Two new emergency grades added: E 7 (7% Cr.) and E 9 (9% Cr.)

	Grade 1	Grade 5	Grade 6	Grade E7	Grade 8	Grade E9
Carbon, max. %	0.15	0.15	0.15	0.15	0.15	0.15
Manganese, %	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60
Phosphorous, max. %	0.04	0.04	0.04	0.04	0.04	0.04
Sulfur, max. %	0.04	0.04	0.04	0.04	0.04	0.04
Silicon, %	0.50 to 1.00	0.50 max.	0.50 max.	0.50 to 1.00	0.50 max.	0.50 to 1.00
Chromium, %	1.00 to 1.50	2.75 to 3.25	2.00 to 2.50	6.00 to 7.50	4.00 to 5.50	8.00 to 9.50
Molybdenum, %	0.40 to 0.55	0.80 to 0.95	0.80 to 0.95	0.40 to 0.55	0.40 to 0.55	0.80 to 0.95

Cold-Drawn Low-Carbon Steel (A179-42) and Electric Resistance Welded Steel (A 214-42) heat exchanger and condenser tubes the hydrostatic test requirements have been changed to provide for higher hydrostatic testing when the material is to be used under more rigorous conditions than would normally be the case. This follows the pattern in other A.S.T.M. steel specifications.

For the same materials also a change has been made in the standard specifications as adopted by the A.S.T.M., in check analysis in line with the provisions in the basic boiler tube specifications. This provides that check analysis may be made by the purchaser rather than the manufacturer and reads as follows, being Sect. 5 in the specifications for both grades:

"5 (a) An analysis of two tubes from each lot of 250 tubes or fraction thereof may be made by the purchaser. Drillings for analysis shall be taken from several points around each tube selected for analysis. The chemical composition thus determined shall conform to the requirements specified in Sect. 4 (See Tables 3 and 5).

"(b) If the analysis of one tube does not conform to the requirements specified, an analysis of two additional tubes from the same lot shall be made, each of which shall conform to the requirements specified in Sect. 4."

The changes in the new standard specifications for still tubes and heat exchanger and condenser tubes adopted as Emergency Provisions can be summarized as follows:

Seamless Low-Carbon and Carbon Molybdenum Steel Still Tubes (A 161-40)

The only change in the Emergency Provisions (EA-A 161) from the present standard specification is in the requirements for sulfur, silicon and molybdenum content (See Table 1). Only change in the present standard specification from the revised form in which it was published by the A.S.T.M. in 1940 is a minor revision in Sect. 18 (Rejection).

Seamless Intermediate Alloy-Steel Still Tubes for Refinery Service (A 200-40)

In the Emergency Provisions (EA-A-200) Grades 2, 3 and 4, in the standard specification, have been deleted from the specification for the duration of the war.

Type CrMo has been removed from Specification A 188-40 and added as Grade 8, with its chemical composition moderately changed. It was formerly a 4 to 6% chromium and 0.45 to 0.65% molybdenum steel.

Two new emergency grades have been added as Grades E7 and E9, the former having a 6 to 7.50% chromium requirement, the latter 8 to 9.50%. No changes have been made in the physical properties for these two new grades except that the Brinell Hardness is established at 179 max., while all other grades in this classification remain at 163 max. (See Table 2)

The only change in the standard specifications from those earlier published is a minor revision in Sect. 19 (Rejection)

Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes (A 179-42)

Only change in the Emergency Provision (EA-A-179) from the standard specifications is the requirement for hydrostatically testing to one and one-half times the specified working pressure under certain conditions. (See Table 3)

The only change in the standard specifications from those earlier published for this grade is provision for the purchaser making a check analysis as described earlier in this article, and a slight editorial revision of Sect. 18 (Rejection).

Seamless Cold-Drawn Intermediate Alloy-Steel Heat Exchanger and Condenser Tubes (A 199-40)

In the Emergency Provisions (EA-A199) Grades 2, 3 and 4, of low chromium content, as given in the standard specification, are deleted for the duration of the war.

Type CrMo has been removed from ASTM Standard Specification A 187-40 and added as Grade 8. Type CrMo was a 4 to 6% chromium, and 0.45 to 0.65% molybdenum steel. As grade 8 its chemical requirements have been changed moderately from Type CrMo.

Two new emergency grades have been added; namely, E7 (7% chromium) and E9 (9% chromium). These grades are to have Rockwell Hardness Numbers not to exceed B89, other grades in this classification not over B85. (See Table 4.)

The only revision of the standard specification from that earlier published is a slight editorial revision of Sect. 19 (Rejection).

Electric Resistance Welded Steel Heat Exchanger and Condenser Tubes (A 214-42)

The only change in the Emergency Provisions (EA-A-214) from the standard specification is the requirement for hydrostatically testing to one and one-half times the specified working pressure under certain conditions. (See Table 5).

The only change in the standard specifications from those earlier published is the provision for the purchaser making a check analysis and an editorial revision in Sect. 18 (Rejection).

Table 3—Requirements for Chemical Composition and Hydrostatic Test, Seamless Cold-Drawn Low Carbon Steel Heat Exchanger and Condenser Tubes

(ASTM A 179-42)

Standard Requirements for Chemical Composition

Carbon, %	0.08 to 0.18
Manganese, %	0.30 to 0.60
Phosphorus, max. %	0.04
Sulfur, max. %	0.045

Sect. 9—Each tube shall be tested at the mill and shall withstand a hydrostatic pressure of 1000 psi.

Emergency Alternate Provisions (EA-A 179)

Requirements for chemical composition unchanged from above.

Emergency Sect. 9—Each tube shall be tested at the mill and shall withstand a hydrostatic pressure of 1000 psi.

Note—When requested by the purchaser and so stated in the order, tubes shall be tested to one and one-half times the specified working pressure (when one and one-half times the specified working pressure exceeds 1000 psi.) provided the fiber stress corresponding to those test pressures does not exceed 16,000 psi., as determined by the following formula:

$$S = \frac{PD}{2t}$$

where:
P = hydrostatic test pressure in pounds per square inch,
D = outside diameter of the tube in inches, and
t = thickness of the tube wall in inches.

Table 5—Requirements for Chemical Composition and Hydrostatic Test, Electric-Resistance-Welded Steel Heat Exchanger and Condenser Tubes

(ASTM A 214-42)

Standard Requirements for Chemical Composition

Carbon, max., %	0.18
Manganese, %	0.30 to 0.60
Phosphorous, max., %	0.040
Sulfur, max., %	0.045

Sect. 9—Each tube shall be tested at the mill and shall withstand a minimum hydrostatic pressure of 1000 psi., for a minimum period of 10 sec. at the full pressure.

Emergency Alternate Provisions (EA-A 161)

Requirements for chemical composition unchanged from above.

Emergency Sect. 9—Each tube shall be tested at the mill and shall withstand a hydrostatic pressure of 1000 psi., for a minimum period sec. at the full pressure.

Note.—When requested by the purchaser and so stated in the order, tubes shall be tested to one and one-half times the specified working pressure (when one and one-half times the specified working pressure exceeds 1000 psi.) provided the fiber stress corresponding to those test pressures does not exceed 16,000 psi., as determined by the following formula:

$$S = \frac{PD}{2t}$$

where:
P = hydrostatic test pressure in pounds per square inch,
D = outside diameter of the tube in inches, and
t = thickness of the tube wall in inches.

Table 4—Requirements for Chemical Composition, Seamless Cold-Drawn Intermediate Alloy-Steel Heat Exchanger and Condenser Tubes

(ASTM A 199-40)

Standard Requirements

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Carbon, max. %	0.15	0.15	0.15	0.15	0.15	0.15
Manganese, %	0.30 to 0.60	0.50 max.	0.40 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60
Phosphorus, max. %	0.030	0.030	0.030	0.030	0.030	0.030
Sulfur, max. %	0.030	0.030	0.030	0.030	0.030	0.030
Silicon, %	0.50 to 1.00	0.50 to 1.00	0.45 to 0.75	0.50 max.	0.50 max.	0.50 max.
Chromium, %	1.00 to 1.50	2.25 to 2.75	1.50 to 2.00	1.75 to 2.25	2.75 to 3.25	2.00 to 2.50
Molybdenum, %	0.45 to 0.65	0.45 to 0.65	0.60 to 0.80	0.45 to 0.65	0.80 to 1.00	0.90 to 1.10

Emergency Alternate Provisions (EA-A 199)

Grades 2, 3 and 4 deleted for the duration of the war.
Type Cr-Mo from A 187-40 (Seamless Cold Drawn Alloy-Steel (4-6% Cr) Heat Exchanger and Condenser Tubes) added as Grade 8 below.
Two new emergency grades added; E 7 (7% Cr) and E 9 (9% Cr).

	Grade 1	Grade 5	Grade 6	Grade E7	Grade 8	Grade E9
Carbon, max. %	0.15	0.15	0.15	0.15	0.15	0.15
Manganese, %	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60	0.30 to 0.60
Phosphorus, max. %	0.04	0.04	0.04	0.04	0.04	0.04
Sulfur, max. %	0.04	0.04	0.04	0.04	0.04	0.04
Silicon, %	0.50 to 1.00	0.50 max.	0.50 max.	0.50 to 1.00	0.50 max.	0.50 to 1.00
Chromium, %	1.00 to 1.50	2.75 to 3.25	2.00 to 2.50	6.00 to 7.50	4.00 to 5.50	8.00 to 9.50
Molybdenum, %	0.40 to 0.55	0.80 to 0.95	0.80 to 0.95	0.40 to 0.55	0.40 to 0.55	0.80 to 0.95

Refinery Materials Conservation

Gulf Oil Corporation Gives Details on How to Save in Plant Design, Construction and Repair

Most complete specifications and instructions for the conservation of materials and equipment of all kinds in the construction and maintenance of refining plants during the war have been prepared by the Engineering Department of Gulf Oil Corp. They are to be studied and observed and "extended in scope" by all of the company's construction and maintenance forces.

The conditions are given under which substitute or alternate grades of steel are to be used in vessels, piping, bolting material and such equipment as heat exchangers. Wherever possible, used equipment from other company units is to be substituted for new critical equipment, or such items are to be selected if possible from the refiners' cooperative list of surplus equipment maintained at the equipment procurement section of the PAW refining division in Washington. Salvaged material is to be utilized to the fullest extent.

The wartime plant specifications of Gulf Oil Corp. are here published as announced in a recent bulletin from Max B. Miller, Washington, chief of PAW's equipment procurement section.

Wartime Plant Design

Towers

Heads:

Dished heads are to be used when computed thickness does not exceed that of an elliptical head by more than 3/16 in. When difference does exceed 3/16 in. specify that either may be used. Manufacturer to show in his proposal which type he is furnishing. Heads may be made of two or more pieces welded together. Heads to be ASTM A70 fire box grade steel.

Shells:

ASTM A10 or ASTM A7 steel to be used for shell thickness not over ¾ in. and metal temperature not exceeding 500° F. Efficiency of welded joints to be as listed in the API—ASTM code for Unfired Pressure Vessels. Use ASTM A70 firebox grade steel for shell thickness exceeding ¾ in. or metal temperature above 500° F.

In low temperature towers with pressure up to 50 lbs., second hand steel may be used.

Skirts:

For high towers where anchorage is an important item use skirts of ASTM A10 or ASTM A7 steel. For low towers and tanks substitute reinforce concrete structures for skirts, thereby conserving plate steel. Provide short skirts with serrated tops on high temperature towers where expansion is a problem.

Manways and Nozzles:

Within the limitations as prescribed by the API-ASME code use built-up manways and nozzles in place of the integrally forged type. Built-up nozzles or manways to consist of pipe or rolled steel plate walls with welding neck, slip-on, companion, or ring type plate flanges as per our standards. Type of flange to be determined from the design data and expediency in obtaining material.

Design for minimum number of manways. Covers to be ASTM A10 or A7 for temperatures up to 500° F.

Trays:

Use cast iron, of the heat and corrosion resisting type, in place of alloy steel for bubble trays, except when the expected life of the cast iron would be less than one year.

Platforms:

Eliminate, as much as is practical, stair towers and stairs, substituting ladders for stairs. Use minimum number of inter-connecting platforms between towers.

Substitution of Used Vessels:

Make a careful search through the available vessel lists of the various refineries to determine if possibly an old tower can be used in place of the contemplated new one.

Bolting:

For metal temperatures up to 750° F. and for all pressures, specify stud bolts to be A.S.T.M. A-96-39, Class A, 95,000 p.s.i. tensile strength instead of A.S.T.M. A193-40T chrome molybdenum grade. SAE1035 carbon steel, properly normalized and drawn, will meet the physical properties as given for A.S.T.M. A96, Class A. Nuts for studs to be carbon steel A.S.T.M. Spec. A-194-40, Class 2H, oil quenched, heat treated hex nuts.

Gasket Material:

Gasket material to be soft carbon steel, or asbestos, covered with soft carbon steel instead of monel or stainless steel. The use of alloy steel gasket material shall be permitted only where highly corrosive services exist.

Lining:

Where operating conditions will permit, use either a lining of ganister, concrete, or acid proof brick, in place of alloy steel or monel or high copper alloy.

Corrosion allowance to be reduced to ⅛ in. where no corrosion is anticipated.

Heat Exchangers

Exchangers shall be installed as necessary for efficient operation of the still and in such size and number as to require the minimum of critical materials in the entire unit, bearing in mind that reduction in exchanger surface may entail additional heating surface in the heating element and also additional cooling surface.

Corrosion allowance on steel shells to be reduced to ⅛ in. where no corrosion is anticipated.

Nozzles to be built-up type or welding neck type if available.

Tubes to be of welded carbon steel instead of non-ferrous metal where low corrosion water is used for cooling medium, except in cases where the fluid on the oil side is highly corrosive. Selection of tube gauge to be based on two years service.

Tube sheets to be rolled carbon steel instead of non-ferrous metal. Where highly corrosive gases or liquids are encountered, tube sheets shall be lined with corrosive resistant metals.

For coolers and condensers at temperatures up to 450° F., use cast iron heads, covers, and channels. In cases where the fluids are corrosive, Meehanite shall be used instead of cast iron.

For oil-to-oil or oil-to-vapor exchangers at all temperatures up to 850° F., use cast steel conforming to ASTM Spec. A-95-41 or fabricated steel for heads, covers, and channels. Flanges of cast steel ASTM A-216-41T grade WCA may be substituted for forged steel for temperatures up to 850° F. For temperatures above 850° F. use cast carbon molybdenum steel conforming to ASTM Spec. A-157-41, Class C1.

Carbon steel baffles to be used instead of ingot iron.

Bolting material to be carbon steel, heat treated, for service temperatures up to 750° F. Steel to meet physical properties of ASTM Spec. A-96, Class A. For temperatures above 750° F. use low alloy steel, ASTM Spec. A-193 Grade B-7.

Gasket material to be soft carbon steel or asbestos covered with soft carbon steel instead of monel metal or stainless steel. The use of alloy steel gasket material shall be permitted only where highly corrosive services exist.

Used exchangers, now in stock, to be used where service condition permit.

Pumps

General

Spare pumps shall be reduced to a minimum by manifolding one pump to serve as a spare for several where such an arrangement is practical and also by omitting the spare where pump failure will not stop operations.

Substitute used for new pumps where suitable pump is available.

Bolt and gasket material and stuffing box packing to be as recommended by the pump manufacturer for the services involved. In the case of used pumps, follow Gulf standards.

Centrifugal

Manufacturer's standard design and materials are to be accepted for all services involving moderate temperatures and pressures and low corrosion liquids except that im-

pellers and wearing rings are to be of Meehanite.

Where it has been the practice to install duel drive pumps (motor and turbine), omit the motor and install turbine drive.

Casings to be of cast carbon steel, ASTM Spec. A-95-41 for low corrosive service at temperatures between 450° F. and 900° F. and for temperatures above 900° F. use 5% Cr. 0.5% Mo. cast steel.

Casings, impellers, and wearing rings for highly corrosive service to be of silicon iron or silicon bronze instead of monel metal, or alloy steel, if a service life of not less than two years may be anticipated.

For temperatures below 250° F., or where heavy thrust loads do not exist, ball bearings will be permitted without water cooled jackets.

Water cooled support pedestals are required for temperatures above 500° F. However, if for lower temperatures, the manufacturer's design and patterns include provision for such water cooling, he shall not be required to change them.

Horizontally split casings are permissible for temperatures up to 500° F.

Reciprocating

All steam ends and cradles to be manufacturer's standard in material and design.

Liquid ends to be of manufacturer's standard design and materials for all services involving moderate temperatures and pressures and low corrosion liquids.

Piping

Liquid ends to be of cast carbon steel, ASTM Spec. A-95-41 or of forged steel for low corrosive service at temperatures between 450° F. and 900° F.

Liquid ends to be of silicon or high copper alloy for highly corrosive liquids and temperatures up to 450° F. For higher temperatures use alloy steel.

For low corrosive liquids at moderate temperatures and pressures, use Meehanite piston heads and liners with bakelite valves and piston rings where character of liquid permits.

Pumps handling lye or caustic at moderate temperatures are to be all iron.

Field Piping

Observe present practices and standards, keeping the number of valves and fittings to a minimum.

Substitute bends for ells where practical and where layouts permit, utilize these bends to care for expansion.

Piping around Stills and other Operating Units

For by-pass arrangements see "Instruments".

Use butt and lapwelded pipe for all straights in all lines with 150 lb. and 300 lb. flanges and temperatures below 750° F.

Concrete pipe may be used for water services in sizes 12 in. and larger, and transite pipe in smaller sizes.

Bolting material—Use heat treated carbon steel studs, ASTM Spec. A96 Class A for temperatures up to 750° F. in all pressure ranges. For higher temperatures use SAE Spec. 193 Grade B-7.

Gasket material to be soft carbon steel, or asbestos covered with soft carbon steel, instead of monel metal or stainless steel. The use of alloy steel gasket material shall be permitted only where highly corrosive services exist.

Substitute bends for ells where practical and where layouts permit, use these bends to function as expansion relief.

Eliminate check valves at inlet to tower on reflux systems where pump takes suction from same tower.

Eliminate valves at towers which are installed solely to permit testing of lines—use blanks.

Reduce the use of double block valves where leakage might cause contamination between two different lines—use one valve and blank or use plug cock.

To save flanges field weld long runs of pipe where practical.

On short suction lines use only one valve between pump and equipment.

Eliminate, as far as practical, pumpout, steaming down, and steaming out connections to all equipment except towers and heating elements.

Eliminate all welding reducing tees for 150 lb. and 300 lb. below 500° F. welding branch lines directly to mains.

Reduce number of air hose connections, except those at heating elements, towers, and exchangers, Rely on temporary lines for repairs.

Hold drip collecting systems to a minimum.

Cooling water lines to pump glands, air compressors, etc., to be spilled to nearest sewer except when cooling tower or fresh water from city mains is used.

Substitute plug cocks for low pressure service to conserve trim material required in valves.

For simplification of pipe supports, keep all lines possible at ground level.

Omit pipe casings under roads where cover is 12 in. or more, unless secondhand casing material is available.

Valves and fittings to be made as per instructions from Mr. Max. B. Miller, accompanying his letter to Mr. Henderson received June 8, 1942.

Use alloy steel tubing only when life of carbon steel is less than 2 years.

Buildings

Walls: Exterior

Use concrete block, brick, or tile, or a combination of these. Cinder blocks may be used where exterior is to be stuccoed and interior plastered.

Walls: Interior Partitions

Tile or cinder block, plastered, where practical otherwise wood studs with plaster on rock-lath, sheet rock, celotex, masonite, or similar material.

For corridors, toilets, first aid rooms, kitchens, and other locations where sanitation is essential, use smooth clay, structural or partition tile. Use no metal lath.

Lintels

Lintels over exterior doors or windows are to be cut stone or reinforced concrete. Where openings are too wide for stone or where load bearing beam or girder is too close to lintel, use reinforced concrete lintel.

Piers and Columns

Wall piers are to be of brick; columns are to be of reinforced concrete or wood on concrete pedestals 6 in. high.

Floors

Where the bearing power of the soil equals or exceeds the combined dead and probable maximum live load, the first floor shall be poured directly on a well tamped and puddled fill. Expansion joints are to be kept to a minimum with intermediate construction joints to facilitate repairs or replacement.

Roof

Flat type where possible with Junior Gypsum Plank on wood rafters—four-ply roof with tar and gravel—composition flashing carried over parapet and under tile coping.

Parapets

Parapet to be tile coped and of the minimum height permitted by local Building Code.

Roof Drainage

Scuppers, gutters and downspouts to be of wood, all flashed with composition flashing.

Ceilings

Plaster on 'Rock-Lath', painted sheet rock, smooth finished Celotex, Masonite, or equivalent material.

Skylights and Ventilators

All of wood and glass flashed with composition flashing.

Ventilators to be of wood, Breidert, or equal.

Toilet Partitions

To be of marble, slate, or wood—no latch on doors—only metal permitted is the spring hinges on doors.

Windows

Frames and sash of wood; sash double hung with friction catches instead of sash weights. Where fire protection is necessary, doors, sash, and frames are to be 26 ga. metal clad with wood cores or of transite.

No metal or rubber weather stripping.

Screens

Screens to have wood frames with black iron wirescreen.

Hardware

Locks on doors to be kept to a minimum. Use spring hinges on outside doors thus eliminating door checks. No metal escutcheons, push, or kick plates to be used. All hardware to be iron where possible.

Stairs, Railings, Etc.

Where fireproof stairs are necessary, use reinforced concrete with treads surfaced with Non-Slip Alundum crystal topping or equal.

Elsewhere use wood stairs. Wood ladders can be used where practical.

All railings to be of wood.

Plumbing

Vitreous china fixtures where possible.

Bradley fountains of artificial stone.

Std. C. I. soil pipe for vents and sewers in and under building; tile sewer pipe outside building footings.

For hot and cold water, use galvanized steel pipe. Use no copper or brass pipe.

For heating systems use black steel pipe and C. I. fittings.

Other Structures

Supports, Miscellaneous

Exchangers and drums are to be on supports with concrete working platforms and ladders of wood, except when operating conditions require steel ladders and platforms.

Conduits and Pipe Trenches

Concrete conduits and trenches shall be left open with wooden bridges placed where cross traffic is necessary—sewer inlets from such trenches shall be kept to a minimum. Trench walls shall be recessed for future steel covers. When covers are necessary they shall be of movable reinforced concrete slabs.

Paved Areas

Where soil conditions permit, paved areas are to be of unreinforced concrete placed on well compacted fill, with sufficient construction joints to permit of neat repairs or replacement of any settled or fractured areas.

Keep paved area to a minimum, using gravel, shell, or cinder surfacing where practical.

Roads and Driveways

The subgrades for roads and driveways shall be well crowned with ample ditches

and drains and surfaced with gravel, crushed stone, slag, cinders, or other available and suitable local material.

Bridges

Bridges shall be of timber construction unless probable loading requires reinforced concrete and precast concrete pile construction—railings to be of wood designed for future replacement with steel.

Equipment Handling

Eliminate permanent structures such as overhead trolleys, cranes, etc., for the installation, repair, or replacement of machines, exchanger tube bundles, boiler tubes, etc., where practical, relying on temporary timber structures, gin poles, tractor cranes, etc., except where use of such methods would unduly prolong required time for repairs or replacement.

Instruments

Lay out new jobs with the thought that regardless of what past practices has been, we must now use the smallest amount of instruments which will give satisfactory operation.

After the job is laid out, proceed to make a study of any instruments which may be in reclaimed stock that might be used, and assign these first to the job.

The requisitioning of the balance of the material is done with the following practices in mind:

a. Avoid use of copper and nickel-chrome steels wherever such is at all feasible.

b. Use ordinary steel bodies and steel trims for automatic and manually operated control valves, for all but corrosive services and extremely high temperature services.

c. Reduce the number of valves required for the control problem by using only one block at the control valve and a single by-pass valve. The by-pass valve is omitted, however, in cases where the control valve is 2-in. or larger, and gives way to a manual operated hand wheel.

To practice the above conservation the following miscellaneous points must be observed:

a. Pressure gages are to be specified as ordinary steel tubes, wherever such is at all feasible.

b. Specify transite for control boards. Lay out a control panel with three major instruments and a pressure gauge in each 2-foot bay or section, in order to keep size of buildings and panel board materials to a minimum.

c. Orifice plates are to be made of carbon steel where practical.

d. Level floats and float rods are to be made of carbon steel, except in extreme services, which are infrequent.

e. Thermometer and thermocouple wells are to be specified as of ordinary carbon steel, except in the extreme services.

f. Thermocouple lead wires are to be specified as 16 gauge, instead of 14 gauge, which was standard practice before this emergency.

Miscellaneous

Cooperate with the manufacturer, and when he asks us to change the body flange on a valve or other detail, in order to aid his production problem, cooperate to the best of our ability.

Heating Elements

Design

Design equipment for actual operating conditions. Do not add extra safety factors for flexibility to take care of possible future changes in operation.

Tube Sheets

Vertical Heaters: Top tube sheets shall be of gunite or refractory construction, instead of alloy steel.

Horizontal Heaters: Use Meehanite castings instead of alloy steel.

Tube Hangers

For temperatures up to 1400° F., specify Meehanite.

For temperatures over 1400° F., select alloy steels in grades depending ease of replacement.

Tubes

Select tube material on the basis of two years life. If operating conditions permit extra corrosion allowance on carbon steel tubes, thus saving alloy steel, carbon steel should be specified.

Headers

Base design on two years life. For Series 3600 fittings, use cast tube ends and holding members instead of forgings. Specify SAE-4140 alloy steel set screws instead of Bethlehem "Supertemp".

Exterior Walls

Eliminate steel casing on exterior walls. Finish up walls with insulation and weatherproofing.

Stacks

Specify brick instead of steel.

Insulation

Our present specifications for material and application of insulation for towers and pipe lines shall apply, except that rock wool insulation may be substituted.

Electrical

Use thick wall conduit only in hazardous locations or other outside locations where corrosive vapors and/or moisture conditions are bad.

Use thin wall conduit or armored cable in buildings where mechanical protection of wires is necessary.

Use open wiring on insulators or concealed knob and tube work wherever it is possible to do so.

For general work no type RP, RH, RW, or RHT insulation is to be used for wires; use the best suited one of the following:

600-volt insulation—Type R, SN, V, AVA, or SB

5000-volt insulation—Type V or AVA, or an oil base compound, such as Kerite, Okolite, etc.

For 600-volt wiring, such as underground circuits in power plants, etc., where permanence is essential, use Kermite or equal.

In laying out lighting system, use the minimum number of outlets, place the maximum of outlets on each circuit and allow for number spares.

In ordering material, consider use of reclaimed used material available.

Tanks

New Tanks

Use wood stairs, rails, and supports for tanks not exceeding 25 ft. in height—for higher tanks, use steel stairs with wood treads.

Study tank fittings on existing tanks to find if flame arrestors are not in use needlessly on tanks containing products other than gasoline or crude oil.

Before ordering new tank, study list of available idle tanks at all refineries, and permit manufacturer to use suitable material from any such tanks.

Wartime Maintenance and Repair

TOWERS

General

Shortage of steel and lack of facilities for fabricating towers necessitates close inspection of vessels for corrosion and protection of towers by means of linings described below.

Linings

Vessel walls shall be lined with ganister, concrete or acidproof brick, where corrosion protection is required. Present stainless steel lined towers may be repaired with stainless steel provided such repair are minor. Otherwise, lining recommended above must be used.

Trays and Caps

Replace present alloy trays and caps with Meehanite, if life of more than one year can be expected.

The hook bolts used for holding down trays shall be of cast carbon steel instead of forged material.

Baffles

Use carbon steel except where corrosion is excessive, in which case baffles shall be made of split and flattened alloy steel tubes cut to size and welded in place.

Bolting

Replacements of studs shall be made of ASTM A96, Class A material for all pressures, and for temperatures up to 750° F. Over 750° F., our present standard for bolting material shall apply.

Studs removed from service due to damaged threads shall be set aside and machined to smaller sizes when needed.

To secure long life from studs, they shall be lubricated properly to eliminate seizing, and handling carefully in order not to damage threads.

Gaskets

Gaskets shall be replaced with soft carbon steel or asbestos covered with soft carbon steel, instead of Monel or stainless steel. The use of alloy steel gasket material shall be permitted only where highly corrosive conditions exist.

HEAT EXCHANGERS

Tubes

Replace non-ferrous metal tubes with steel tubes, preferably of welded construction, except where corrosion is excessive and two years life cannot be obtained with steel. However, it is not recommended to substitute steel tubes for non-ferrous metals where tube sheets of non-ferrous metal can be re-used, for the reason that steel tubes would damage the non-

ferrous tube sheets and difficulties would arise in securing tight joints.

Where inspection shows that only a few tubes in a bundle are defective, with the remainder in good condition, the defective tubes shall be plugged and the bundle returned to service. This is not new procedure, but it should be exercised to a greater extent than has been the case heretofore.

When replacing tubes or tube bundles, old tubes shall be cut close to the tube sheets and inspected. The good tubes may be used for shorter bundles, electric conduits, etc. Quite often, tubes are only defective on one end. This defective portion should be cut away and tubes re-used.

Bolting and Gaskets

For replacement of these items, follow instructions given under "Towers".

Tube Sheets

Replace high copper and alloy steel tube sheets with carbon steel. Where service conditions do not permit this substitution, steel tube sheets lined with corrosion resisting metals shall be used. Tube sheets with damaged gasket surface and tube holes may be reconditioned by refacing and reaming tube holes and recutting grooves. Where any doubt exists as to the strength of tube sheets due to refacing, Pittsburgh Engineering Department should be contacted.

Baffles

Use carbon steel baffles instead of ingot or wrought iron.

Steam Engine

Remachine worn piston rods and return to service, inserting split neck ring in bottom of stuffing box and rebushing the gland.

Restore tension to piston rings by peening inside of rings.

Repair worn cross head pins by remachining, closing the brasses and boring to new pin size. Compensate for shortening of brasses by spot welding plate of proper thickness to back of brasses.

Where pin is loose in cast iron cross head, ream cross head and weld and machine pin to fit. If cross head is of steel, weld and ream to fit pin. Where metal spraying equipment is available, pins may be sprayed where they fit into cross heads.

Restore worn crank pin and wrist pin brasses to their original sizes by boring out, leaving $\frac{1}{8}$ in. of original metal at each end, and babbitting them back to their original size.

Restore governor parts, where practical, by welding and using cast iron bushings instead of bronze.

Centrifugal Pumps

Recondition worn case and impeller wearing rings by boring and bushing the case ring to fit the remachined impeller ring.

Tighten loose impellers on shaft by machining shaft at impeller, truing up impeller bore and inserting split bushing.

Loose ball bearings to be tightened same as impellers.

Grind worn, hardened shaft sleeves to length equal to depth of stuffing box.

Metal spray worn shaft sleeves where practical.

Renew worn brass wearing sleeves by boring and babbitting.

Replace acid bronze impellers and wearing rings with Meehanite for corrosive service or cast iron for non-corrosive service.

Reciprocating Pumps

Restore unbroken, but worn piston heads by welding on bands and machine to fit former or rebored liner.

Repair piston rods in same manner as for steam piston rods.

When renewing pump liners, true up piston head and bore liner to fit.

Replace old piston rings when condition warrants.

Replace piston rods of stainless steel, monel metal or bronze with carbon steel, conforming to SAE 1025 carburized and hardened where service will permit.

Substitute Bakelite for steel valves where service permits and where temperatures do not exceed 400° F.

Replace acid bronze valves and liners with Meehanite for corrosive service and cast iron for non-corrosive service.

Repair Bakelite valves by refacing and metal bushing them.

Replace alloy valve springs with steel wire when service permits.

Save corroded liquid ends for possible future use in non-corrosive service.

In repairing valve gears, substitute cast iron for bronze where feasible.

Replace Monel metal or stainless steel gasket material with soft carbon steel. Use alloy gasket material only for highly corrosive service.

Turbines and Motors

Inspect frequently for small leaks in steam nozzle rings. When such leak is detected, dovetail small copper wire in the defective passages.

Bearings for turbines and motors are to be repaired as shown under "Centrifugal Pumps".

Air and Gas Compressors

Do not remove piston head unless necessary, as its removal frequently destroys the rod; instead, true up the rod and piston and install new liner to fit. However, when local facilities permit, the liner may be rebored, the piston nut and part of piston machined off, thus preserving the rod, and a new piston and nut installed.

Pipe and Fittings

Keep well painted, paying special attention to surfaces resting on wood supports.

Worn or broken valves and fittings to be returned to shop for repairs or sent to outside shop qualified to make such repairs.

HEATING ELEMENTS

Tube Sheets

Top tube sheets in vertical heating elements shall be replaced with gunite or refractory construction instead of alloy steel. In case of minor repairs alloy steel may be used.

Tube Hangers

Hangers subject to temperatures up to 1400° F. shall be replaced with Meehanite. Over 1400° F., replaced with alloy steel.

Tubes

Tubes removed due to end corrosion shall be safe ended and preferably installed in sections where less severe conditions exist.

The tube material shall be selected on the basis of two years life. When alloy steel is needed, grade of alloy shall be selected on this basis.

Headers

Where U-bends at outlet sections show corrosion and no longer are fit for service in this section, they shall be shifted to less severe sections.

Tube ends showing enlarged and damaged tube holes shall be reconditioned by means of installing safety sleeves as per Gulf standard.

Holding members bent in service shall be straightened and reheat treated.

Set screws showing worn and damaged threads, no longer safe for their original service, shall be set aside for remachining to the next smaller size when required.

Corroded flanges and terminal fittings shall be built up with weld metal of similar analysis and remachined, if necessary.

Pipe and fittings

When replacing piping, check to see whether any of the valves, fittings, and flanges can be eliminated. The following points will assist in deciding on the elimination of such items:

Substitute bends for ells where practical.

Eliminate check valves at inlet to tower on reflux systems where pump takes suction from same tower.

Eliminate valves at towers which are installed solely to permit testing of lines. Use blanks.

Reduce the use of double plug valves where leakage might cause contamination between two different lines. Use one valve and blank or use plug cock.

To save flanges, field weld long runs of pipe where practical.

On short suction lines, use only one valve between pump and equipment.

Eliminate welding reducing tees for 150 lb. and 300 lbs. below 500° F., if no tees are in stock, welding branch line directly to the main.

Use buttwelded and lapwelded pipe for all straights in all lines with 150 lb. and 300 lb. flanges at temperatures below 750° F.

Select material for piping on the basis of two years life. When alloy steel is needed, grade of alloy shall be selected on this basis.

Flanges shall be reconditioned after removal from service, if practical, and placed in stock for future use. Where contact surfaces are damaged and flange is corroded at the inlet, build up with weld metal and reface. Forged steel companion flanges, where threads are damaged, are to be bored for use as slip on welding flanges.

Worn or broken valves and fittings shall be returned to shop for repairs or sent to outside shop qualified to make such repairs. In selecting repair material for valves, the recommendations set up by the O. P. C. shall be followed.

Bolting and Gaskets

For replacement of these items, see instructions given under "Towers".

Painting

Keep piping well painted, paying special attention to surfaces resting on wooden supports.

Instrument Maintenance

Where possible, control valve plugs, especially in the larger sizes, may be repaired by welding with proper alloy wire and then resurfacing to proper size.

Stainless steel thermocouple wells, when removed because of pitting due to either erosion or corrosion, may be ground and polished sufficiently to remove these defects but wall thickness must be watched and work done in accordance with E D S 780 in Standard P 1017.

Oil Company's Chemicals-from-Natural Gas Refinery Takes

Methane, ethane and other hydrocarbons from natural gas are being converted by partial oxidation to methanol (methyl alcohol), formaldehyde, acetaldehyde, methyl acetone solvents and allied compounds at the Tallant, Okla., chemical plant of Cities Service Oil Co.

The Tallant plant, said to be the first successful commercial plant utilizing controlled air-oxidation in the large-scale production of formaldehyde and methanol, was built in 1928. The development of the oxidation process used there resulted from the investigation of a new treating procedure for reducing corrosion of natural gas pipelines.

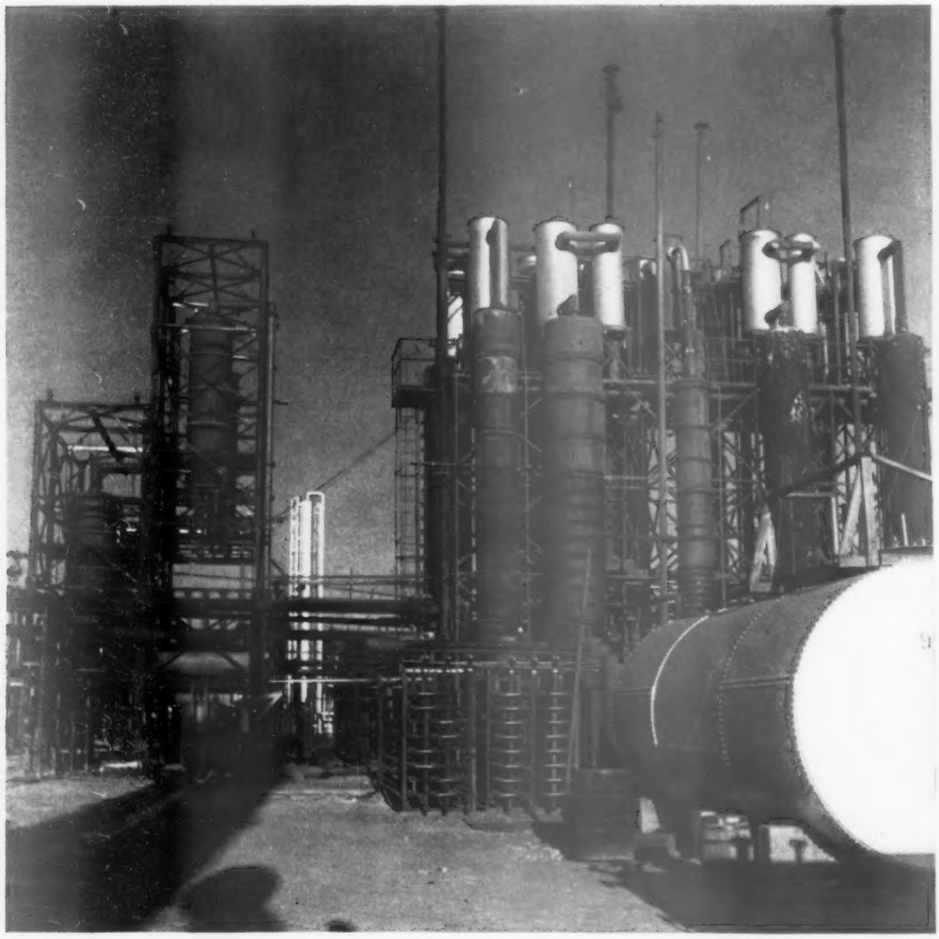
The corrosion was believed due to the presence of small amounts of oxygen in the gas and, in order to eliminate this oxygen, additional quantities of oxygen (air) were added and the gas subjected to pressure and high temperature to initiate oxidation and remove all of the oxygen. Oxidation products condensed from the treated gas were found to contain methanol, formaldehyde, acetaldehyde and acetone. Subsequently the production of the Tallant plant has been repeatedly expanded.

Cities Service controlled air-oxidation process operates at moderate temperatures and pressures, thus eliminating heavy forgings and scarce materials which synthetic processes operating at high temperatures and pressures must have. Natural gas is plentiful. The company is the pioneer producer of formaldehyde by this method—developed in its own research department.

Methanol and formaldehyde are produced in approximately equal quan

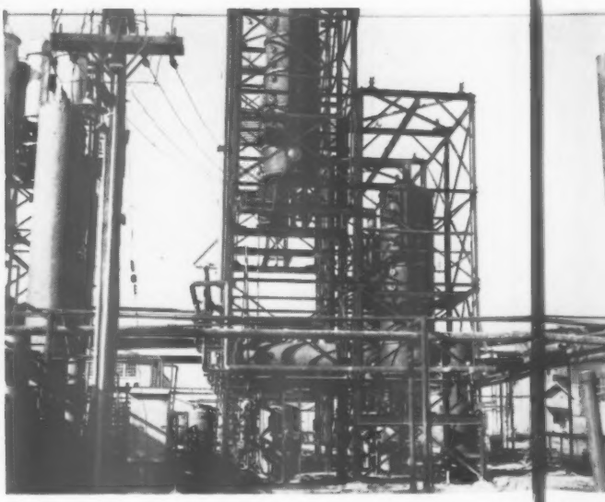
tities, to
solvents,
fractiona
to meet

Met
gas pipe
maldehy
paraform
and may
The me
grades.



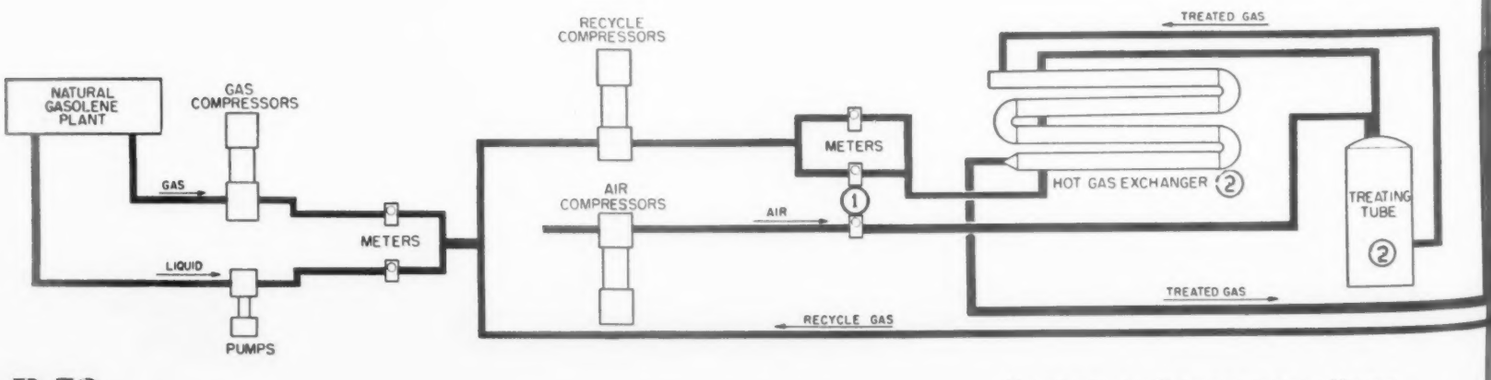
ABOVE—General view of the plant for making chemicals from natural gas of the Cities Service Oil Co. at Tallant, Okla.

1—Oxidation control meters at the Tallant chemic plant



3—Continuous fractionating columns for separation of m anol an formaldehyde

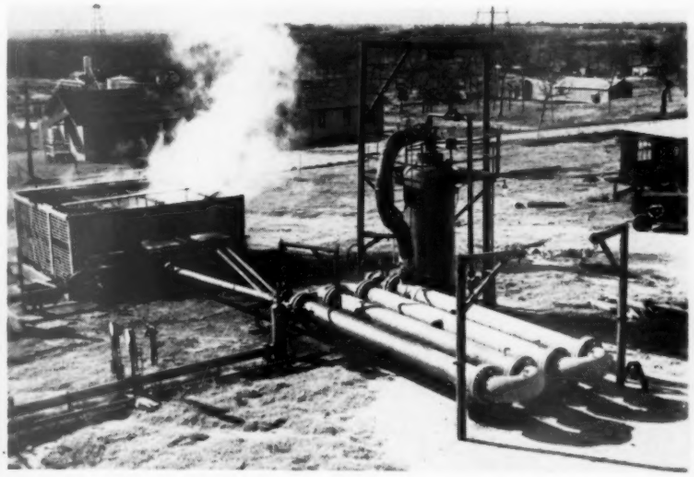
BELOW—Flow plant of the chemicals plant at Tallant, where methanol and formaldehyde are produced as a crude mixture and separated and refined into commercial products. Parts of the unit which are numbered are illustrated in the photographs above



...akes Formaldehyde, Methanol and Related Compounds

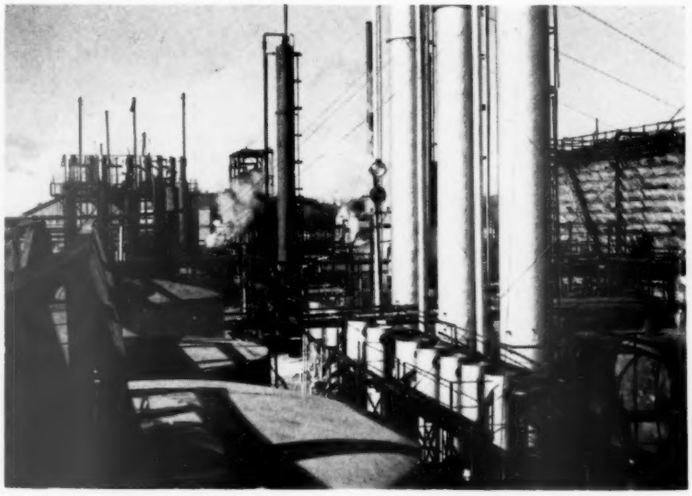
...ities, together with smaller quantities of acetaldehyde and methyl acetone solvents, all as a crude mixture. This crude mixture is then separated by fractionation into its major components, each of which must be further refined to meet commercial and U.S.P. specifications.

Methanol is marketed as a component of anti-freeze for radiators, as a gas pipeline hydrate solvent and as the commercially pure compound. Formaldehyde is sold as U.S.P. formalin (minimum 37 weight-per cent), or as paraformaldehyde. Acetaldehyde produced at the plant is marketed as such and may also be converted into commercial crotonaldehyde or paraldehyde. The methyl acetone solvents have many uses and are available in several grades.

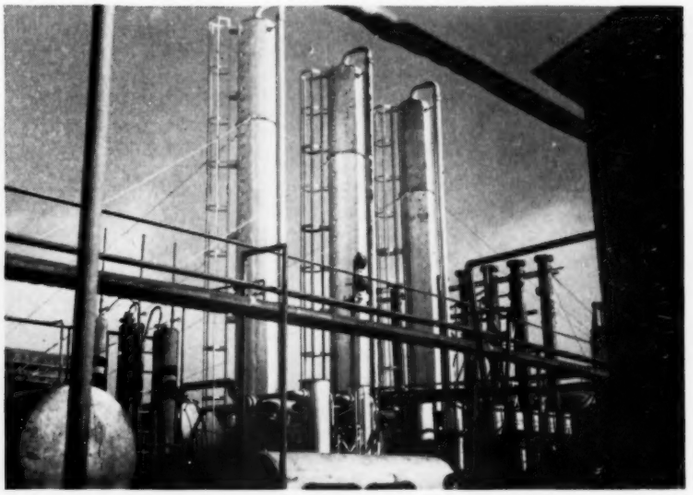


2—Heat exchangers, treating tube and aftercooler (left) for oxidation of hydrocarbon gases

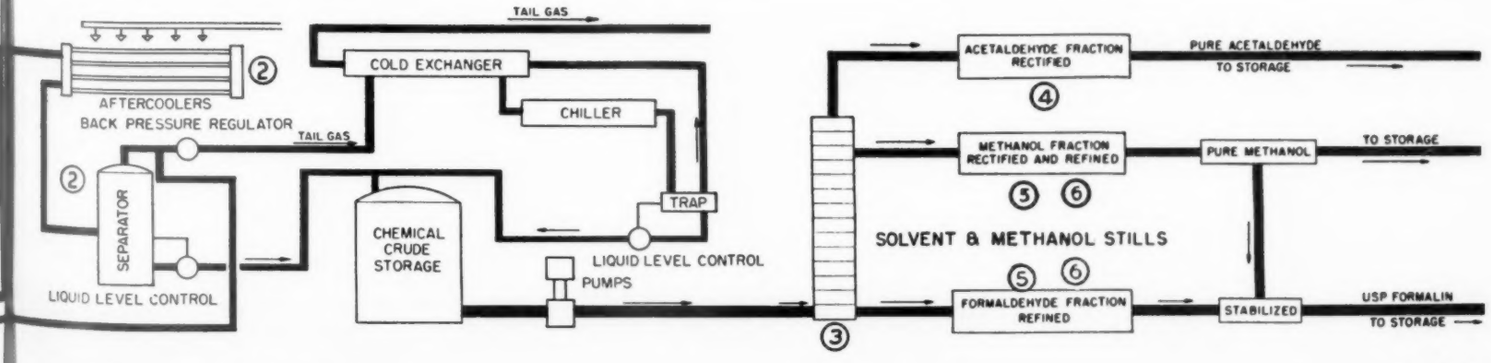
4—Acetaldehyde rectifying column



5—Methanol, acetaldehyde and solvent fractionating and rectifying columns



6—Methanol and solvent frationating and rectifying columns are shown in the center of the picture



Design and Construction of a 33-Ft. Diameter Arc-Welded Vacuum Fractionating Tower*

By Egon F. Brummerstedt**

Egon F. Brummerstedt

New methods of design and construction by arc welding were used in the erection of one of the largest fractionating towers ever erected at a petroleum refinery. The design and construction of the 33-foot diameter arc-welded steel trays, the method of design for vacuum operation and the design and attachment of the vacuum stiffeners are believed to be unique in the refining industry. As noted, the savings in cost, time and materials required were considerable by this method of construction, the last named being most important in the wartime period.

Although the calculations are given in detail, they are essentially of an elementary nature. The article was written several months before actual construction of the vessel began and the photographs included in this publication were submitted later to substantiate the description of the method of construction.

The identity of the oil company building this tower and its location cannot be disclosed at this time. The author nevertheless acknowledges the cooperation of the owner in supplying photographs and authorizing publication of the article. He also expresses his appreciation to his associates in the Petroleum Refinery Division of the Foster Wheeler Corp. for their constructive comments.

MANY problems were solved by the use of arc welding in the design and construction of a 33-foot diameter vacuum fractionating tower, one of the largest towers in existence and also one of the largest individual units of equipment ever used in a refinery.

The author's firm was asked by a prominent refining company to design and construct a vacuum stage addition to supplement a crude still installed in 1940. The high rated capacity of this unit, 37,000 bbls. per operating day, and the vacuum operation of the fractionating tower resulted in a required diameter of 33 ft. To obtain the different products, mainly different grades of lubricating oils, twelve 33-ft. diameter bubble trays were required, in addition to several of smaller diameter in the top and bottom of the tower. The close fractionation requirements of a vacuum tower determined many features of the bubble tray design, such as number, size and spacing of vapor risers, maximum allowable deflection of supports to insure steady liquid flow and constant level, and spacing between trays.

The process requirements resulted in the arrangement shown in Fig. 1. The following details and problems in connection with this tower were solved by the engineering staff of the firm, and approved by the customer. Amount of electrodes consumed, cost of materials, labor, and production given are based on the firm's welding shop standards.

The first and most important problem was

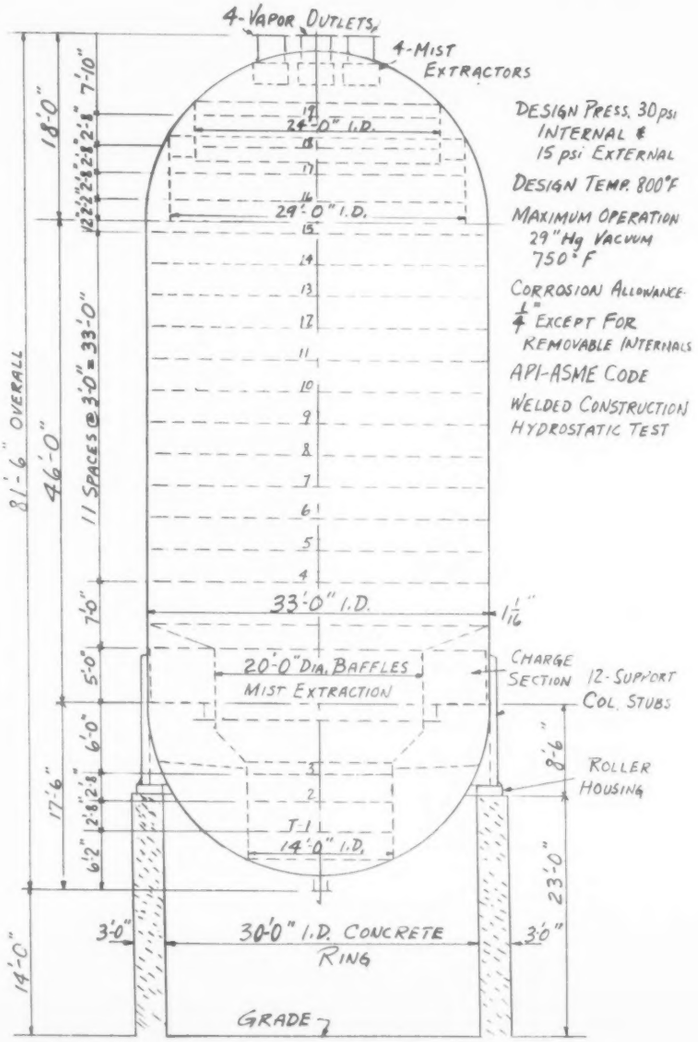


Fig. 1—Diagram of vacuum fractionating tower

*Given first place in divisional awards, Petroleum Industry Classification, in the $200,000 Industrial Progress Award Program of the James F. Lincoln Arc Welding Foundation, Cleveland.

**Mechanical Engineer, Petroleum Refinery Division, Foster Wheeler Corp., New York.

the design and construction of the bubble trays. From the arrangement sketch it can be seen that the following is the total tray area:

No. Trays	Diam. Ft.	Area per Tray Sq. Ft.	Total Area Sq. Ft.
3	14	154	462
12	33	855.3	10,264
2	29	660.5	1,321
2	24	452.4	905

Total tray area for tower 12,952 sq. ft.

This total area shows the importance of designing a tray with the lowest overall cost per square foot, including decking, caps and supports, which would meet the general requirements. These included:

1—Two-inch inside diameter vapor risers with 3-in. I.D. adjustable caps spaced on 4.5-in. equilateral triangular pitch, resulting in 5396 risers per 33-ft. diameter tray.

2—Maximum deflection to be 1/16 in. with a liquid load 2 in. above height of weir. With a normal weir height of 3 in., this meant 5 in. of liquid, of specific gravity not exceeding 1, or 26 lbs./sq.ft., to be added to the weight of the tray itself.

3—The maximum length of flow across the tray at any one elevation of the plate is not to exceed 5 ft., requiring 6 levels of 2-in. differences in elevation per tray, or a total of 10 in. difference in elevation across the tray. This was necessary to reduce the hydraulic gradient and insure a steady flow and fixed liquid level. On this depends the uniform passage of the vapors thru the slots in the caps, and the corresponding efficiency of fractionation. The adjustable height of caps also helped insure close fractionation and low pressure drop through the tower.

Several types of tray material were considered. For smaller diameter towers, cast iron sections of $\frac{3}{8}$-in. minimum thickness are generally used. The weight of these cast trays with a large number of small caps is approximately 60 lb./sq.ft., (based on previous experience) which, added to the liquid load, makes the resultant load of 86 lb./sq.ft. almost impossible to support with a deflection of only 1/16-in. in a span of 33 ft.

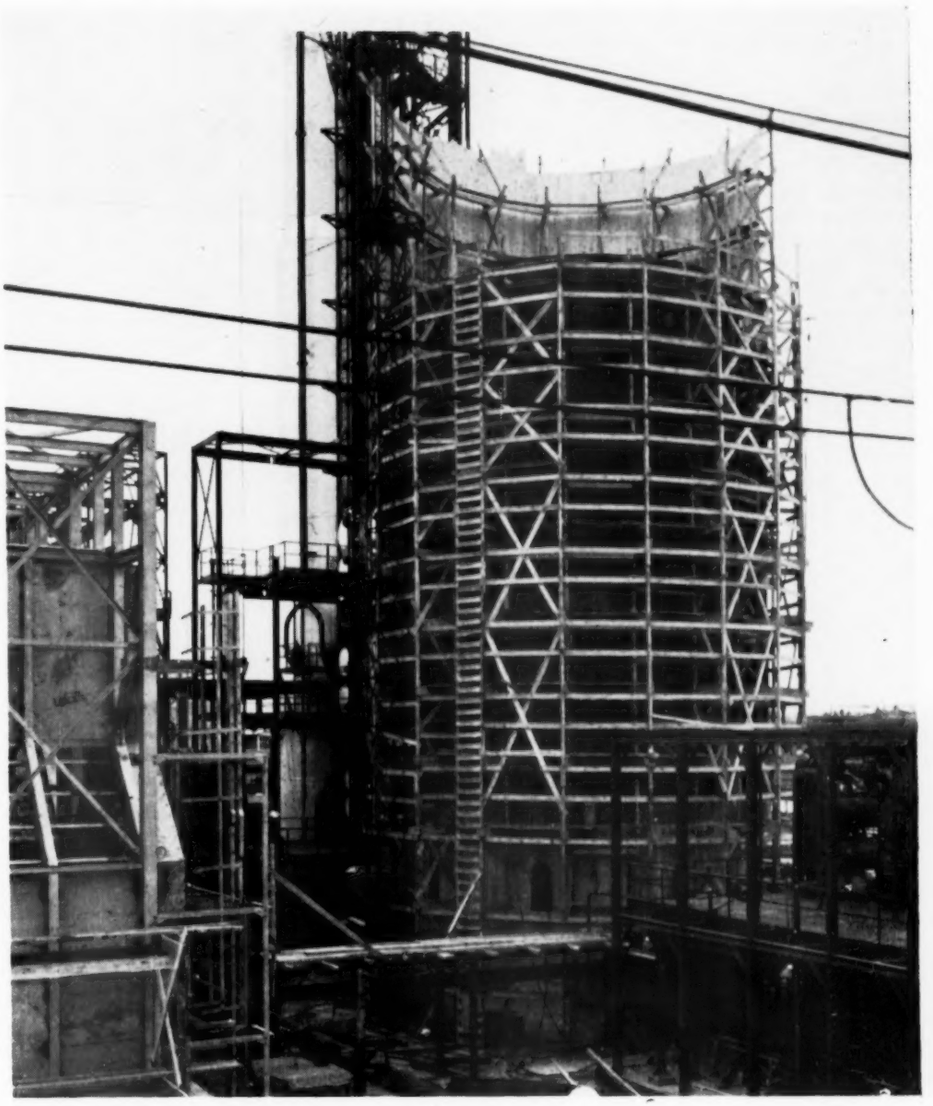
A rough layout of the excessive supporting steel was made, and the total cost per cast iron tray estimated as follows:

25,000 lbs. of supporting steel	@ $0.12 =	$3,000
51,300 lbs. of cast-iron	@ 0.10 =	5,130
Assembly bolts and gaskets		500
1/12 total pattern costs		400
76,300 lbs. installation of above @ $50 ton		1,900
		$10,930
	(Or $12.80/sq. ft.)	

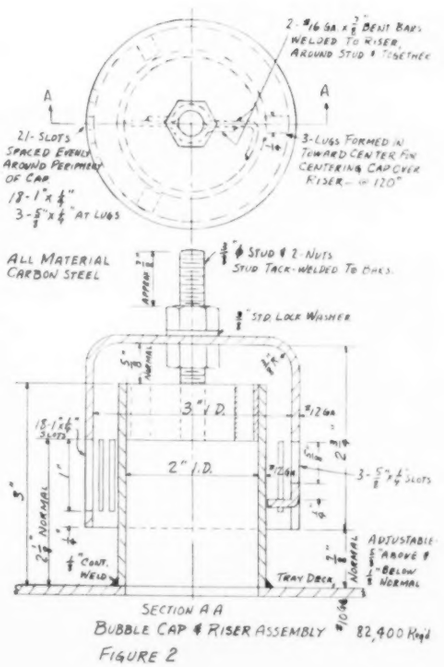
This does not include the additional cubic yards of concrete for foundations due to this excessive weight. Neglecting that, the cost of cast-iron trays and supports, therefore, amounts to 12,952 sq.ft., @ $12.80 = $165,800.

A semi-permanently installed tray of $\frac{1}{2}$-in. plate steel was considered and rejected because of the same excessive supporting steel, and differential expansion was feared because of the high operating temperature (750° F.). This installation required $\frac{1}{8}$ in. corrosion allowance on all exposed surfaces, and this thickness resulted in a total cost of $13.50/sq.ft., or more than the cast-iron tray.

By making the tray section removable through



The 33-ft. diameter vacuum fractionating tower in an advanced stage of construction


2-9/16 Ga. x 3/8" Bent Bars Welded To Riser Around Stud & Together
A
A
21-Slots Spaced Evenly Around Perimeter of Cap
18-1" x 1/4"
3-5/8" x 1/4" At Lugs
3-Lugs Formed In Toward Center For Centering Cap Over Riser — @ 120°
All Material Carbon Steel
Approx
3/8" Stud & 2-Nuts Stud Tack-Welded To Bars
3/8" Std Lock Washer
3" I.D.
2" I.D.
3-5/8 x 1/4 Slots
Adjustable 1" Above & 1" Below Normal
Tray Deck
Section A A
Bubble Cap & Riser Assembly
82,400 Kgd
FIGURE 2

14 in. X 30 in. oval manholes installed in the shell at every tray interval, and thus making them quickly replaceable, the corrosion allowance can be omitted and a thinner steel plate used, thus affecting a tremendous saving in weight and materials and making it more practicable to meet the 1/16 in. deflection requirement.

On this basis, a final design meeting all previously mentioned requirements was laid out. Its most important features indicate the importance of arc-welding in this type of construction; in fact, no other method would have been very practical, not to mention the considerable savings involved. Fig. 2 shows the method of attaching the adjustable bubble cap and vapor riser to the tray deck, which is of 10 gauge carbon steel plate in accordance with ASTM A-10 specification.

It will be noticed that arc welding is required to properly attach and seal the vapor riser to the deck plate and that the adjustable cap is supported by a welded attachment of the cap stud and two bent bars to the top of the riser. This was the final approved design. Approxi-

mately 0.10 lb. of electrode was consumed per riser, making a total of 8240 lbs. required for the 82,400 assemblies provided for the tower. The cost per cap assembly, including cap, nipple, stud and two nuts, is approximately $0.50, exclusive of attachment to plate. A firm specializing in this type of fabricated product bid a total $92,600 for all 19 trays, including all deck plates, caps, risers, assembly bolts, trusses and supports except the main beam. This was an average of $7.15/sq.ft.

With this basis the following cost per 33-ft. diameter tray was calculated as follows:

	Est. Wt. Lbs.	Cost
Tray deck, caps, risers, trusses and minor supports	30,000	$6125
Main supporting beam— (half of built up 2-tray girder)	5,000	600
	35,000	
Install 17.5 tons @ $50 per ton		875
Total cost per tray		$7600 (Or $8.90/sq. ft.)

This is a saving of $3.80/sq. ft. or 30% less than the cast iron tray. The total saving for the tower is, therefore, 12,952 @ $3.80 = $49,200. The saving in weight is 41,300 lbs. per 33 ft. tray or 43.8 lb/sq.ft. This is a total weight reduction of 567,000 lbs., and is 54% less than the weight of the cast trays.

An even more important consideration is the speeding up of delivery. By saving the time required for making patterns, and for excessive machining which would have been required on the castings, two months of construction time were saved.

Beam Calculations

The problem of 1/16 in. maximum allowable deflection was solved by the use of a built-up welded girder of such depth as to support two of the trays, as shown in Fig. 3.

The beam was bolted to seats welded to the sides of the shell, and to guide lugs welded to correspond with the top of the beam. A ⅛ in. corrosion allowance was added all around to insure that the support would outlast the tray, and that the latter could be replaced without the former. The four ¾ in. continuous fillet welds 33 ft. long required 220 lbs. of welding wire (electrodes) per beam, or 1320 lbs. for the six major beams. If riveted construction had been used 4 L's 6 in. x 6 in. x 1 in. would have been required for the flanges instead of two plates 14 in. x 1 in. This amounts to an additional weight of 1800 lbs. per beam, or 17.5% excess over the welded beam weight of 10,300 lbs., exclusive of the rivets.

The following calculation indicates selection of beam to meet the deflection requirements and checks the strength of the fillet welds:

With a large-scale layout the tray area supported by the beam was calculated to be 500 sq.ft. or 58.5% of the total tray area.

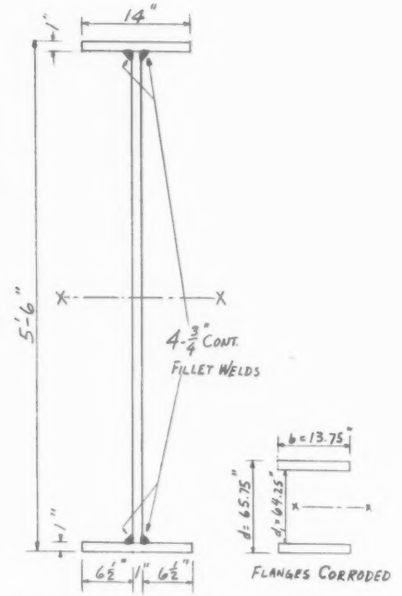
	Lbs.
Weight of tray material for 500 sq. ft.	17,500
Weight of liquid @ 26 lbs./sq.ft.	13,000
Weight on one tray	30,500
Weight on two trays	61,000
Est. weight of beam	10,500
Total load	71,500

The beam is supported on 12 in. horizontal stiffeners, leaving unsupported span of 31 ft.

I value needed for 1/16 in. deflection:

$$I = \frac{5WL^3}{384\,Ed} = \frac{5 \times 71{,}500 \times 372^3}{384 \times 23{,}200{,}000 \times .0625} = 32{,}900 \text{ in.}^4$$

where 23.2 x 10^6 is the modulus of elasticity of steel at the design temperature of 800°F. Assume beam consisting of a web plate ¾ in.



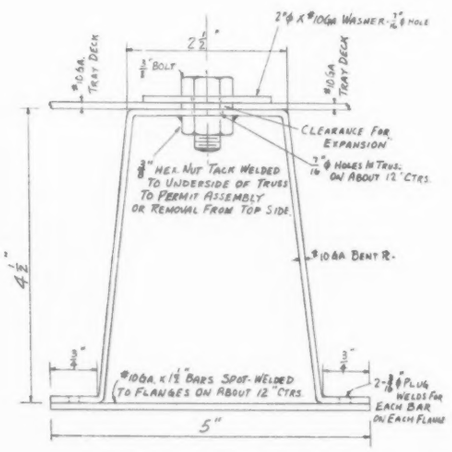
DETAIL OF MAIN TRAY BEAM - 32'-8" LG.
2" CLEARANCE AT EACH END FOR EXPANSION.
MOMENT OF INERTIA OF BEAM ABOUT AXIS X-X AFTER ⅛" CORROSION - LEAVING ¾ WEB & FLANGES

$I_W = \frac{bd^3}{12} = \frac{.75 \times 64^3}{12} =$ 16,384 in.⁴

$I_f = \frac{b(d^3 - d_1^3)}{12} = \frac{13.75(65.75^3 - 64.25^3)}{12} =$ 21,786

TOTAL I = 38,170 in.⁴

FIGURE 3.


2"ϕ X ϕ10GA WASHER - 7/16" ϕ HOLE
2½"
⅝" BOLT
#10GA TRAY DECK
#10GA TRAY DECK
CLEARANCE FOR EXPANSION
⅝" HEX. NUT TACK WELDED TO UNDERSIDE OF TRUSS TO PERMIT ASSEMBLY OR REMOVAL FROM TOP SIDE
7/16" ϕ HOLES IN TRUS. ON ABOUT 12" CTRS.
#10GA BENT R.
4½"
3/8"
3/8"
#10GA. X 1½" BARS SPOT-WELDED TO FLANGES ON ABOUT 12" CTRS.
2-⅜" ϕ PLUG WELDS FOR EACH BAR ON EACH FLANGE
5"

MINOR TRAY SUPPORT - TRAPEZOIDAL TRUSS
SHOWING METHOD OF SUPPORTING TRAY DECK SECTIONS.

FIGURE 4.

x 64 in. and two flange plates ¾ in. x 14 in.

Then per Fig. 3,

I of web plate	= 16,384
I of flange plates	= 21,786
I of beam	= 38,170 in.⁴.

This is, therefore, ample.

Adding ⅛ in. corrosion allowance to all exposed surfaces of the beam, it requires—

1 web plate	1 in. x 64 in.	= 5.33 sq.ft/ft.
2 flange plates	1 in. x 14 in.	= 2.33 sq.ft/ft.
		7.66 sq.ft/ft.

Total weight of beam = 7.66 x 32.67 ft. = 250. sq.ft. @ 40.8 lb./sq.ft. = 10,200 lbs., which is within the estimated weight.

Maximum bending moment — after corrosion:

$$M = \frac{WL}{8} = \frac{71{,}750 \times 372}{8} = 3{,}340{,}000 \text{ in.-lb.}$$

Unit tensile stress in extreme fibre after corrosion:

$$S = \frac{MC}{I} = \frac{3{,}340{,}000 \times 32{,}875}{38{,}170} = 2880 \text{ psi}$$

Allowable tensile stress of fillet weld @ 800°F = 18% of tensile strength (API-ASME Code) = 55,000 x.18 = 9900 psi

Efficiency of fillet welds for structural (Group C) steel = 51% (API-ASME Code)

Maximum allowable working stress of weld = 9900 x .51 = 5050 psi.

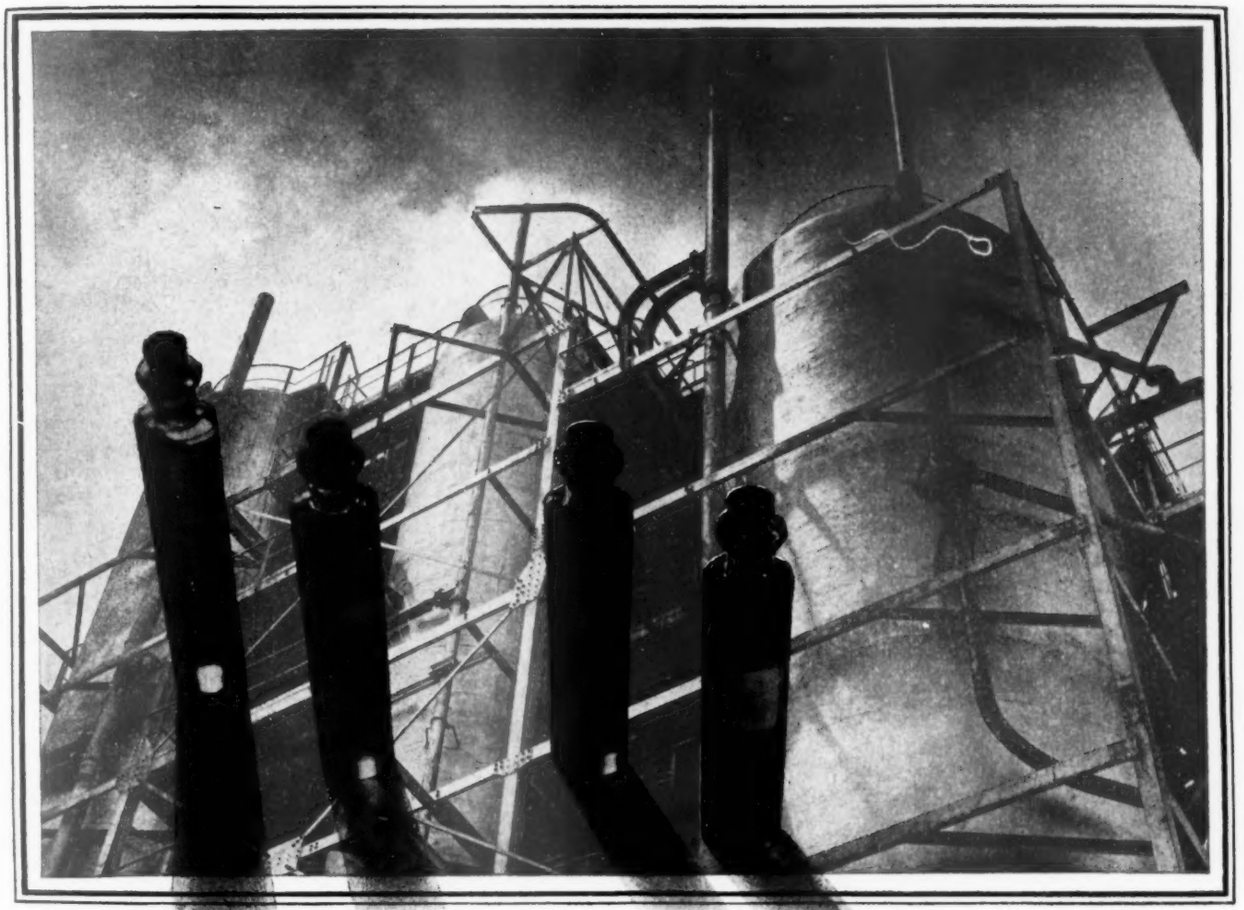
This is considerably more than the stress in the beam flange. The net area of two ¾ in. fillet welds after ⅛ in. corrosion, measured across the throat, = 2(.75 cos 45° − .125)

= .810 sq. in.

This being greater than the ¾ in. web and flange plate, it is sufficient to transfer the stress from one to the other, and prevent flange slippage by resisting the maximum horizontal shear at the ends of the beam. Similar calculations were made for all other beams and minor supports.

To provide a seal, 2½ in. x 2½ in. by ⅜ in. circumferential angles were continuously welded to the shell at the level corresponding to its tray section and the latter bolted to it. This attachment could only be made by arc-welding. A ¼ in. fillet seal weld was used to allow for ⅛ in. corrosion; the total number of feet being equal to the perimeters of all 19 trays, or 1710 ft. @ .3 lb/ft. = 513 lbs. of electrodes. Every tray section of different level ended with an adjustable weir, bolted to an angle welded to the tray deck. Seal angles were welded to the minor support beams and channels. The trapezoidal support trusses, on which the tray sections were clamped together were of bent 10 gauge plate with lateral bracing bars spot-welded to the bottom flanges. (See Fig. 4.)

Summarizing, it may be stated that arc-welding was used wherever attachment was permanent; only at removable joints were the



Tomorrow's Products . . .

Today aviation gasoline, toluene, butadiene are the tools of war in which many KELLOGG-built plants are specializing—products vital to our future and needed in ever-increasing quantities to assure Victory.

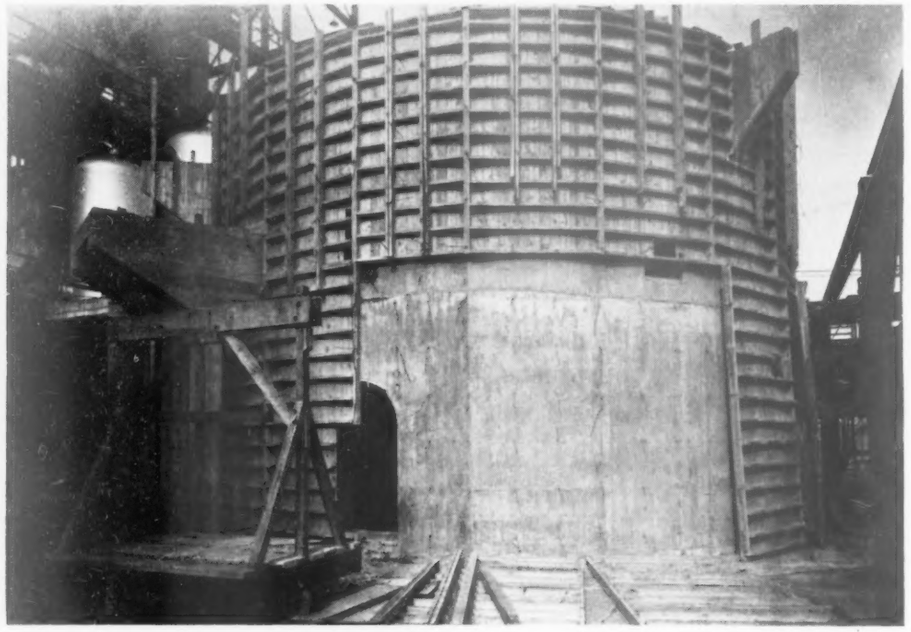
The accelerated development of these processes of today is swiftly shaping the products of tomorrow. KELLOGG'S share in the solution of the needs of today gives assurance to refiners that KELLOGG plants will meet the new and changing demands of the future.

KELLOGG

DESIGN, CONSTRUCTION and LICENSING

- Catalytic Processes for Cracking, Hydroforming, Reforming, Dehydrogenation, Alkylation, Desulphurization
- Gasoline Products Company, Inc. . . . . Pyrolytic Cracking
- The Polymerization Process Corporation, Thermal and Catalytic Polymerization
- JUIK Processes . . . . . for Lubricating Oil Refining with Propane and Phenol • Deasphalting • Dewaxing • Solvent Extraction and Acid Treating Plants

THE M. W. KELLOGG COMPANY • JERSEY CITY, NEW JERSEY • 225 BROADWAY, NEW YORK
Los Angeles: 609 South Grand — Tulsa: Philtower Building



Bottom of the tower in an early stage of construction, showing the concrete base

tray sections joined by clamps, bolts, and gaskets.

Experienced operators claim that this type of tray construction is only locally bent and warped in case of a sudden "shot of water" in the tower; castings would be torn loose and crack and result in a "cascading" of damage to the bottom of the tower. Therefore, less off-stream time would be required for replacement and repairs.

In the event that corrosion is greater than anticipated, the carbon steel tray plates could be replaced after the war with an identical tray of 12 — 14% chrome alloy steel, which would cost approximately $5/sq.ft. more, but would be corrosion-resistant.

Design of Shell and Heads

The trays being now completely designed, the shell proper and all attachments can be laid out and checked. Because of its size, the shell must be assembled and welded on the refinery site in the field. All parts that can be readily shipped will be prefabricated in the shop and shipped in sections ready for field assembly.

The arrangement sketch states that the design and construction are to be in accordance with the "API-ASME Code for the Design, Construction, Inspection, and Repair of Unfired Pressure Vessels for Petroleum Liquids and Gases." Paragraph W-403 of this code limits the out-of-roundness of the shell, i.e., the difference between the maximum and minimum diameter of any cross-section along the length to ¾ in. In a vacuum tower the resistance to collapse is inversely proportional to the out-of-roundness, therefore this requirement was reduced to what seems an absolute minimum of ⅝ in. Another severe tolerance requirement was the alignment of all tray support beams and attachments within 1/16 in. of a level plane perpendicular to the axis of the tower.

The shell thickness was checked for the internal design pressure of 30 psi. and ¼ in. corrosion allowance in accordance with the following formula in Par. W-309 of the API-ASME Code:

$$t = \frac{p\,D}{2\,s\,E - p} + c$$

where t = thickness of plate in inches,
p = design pressure (internal) psi,
D = inside diameter in inches before corrosion allowance is added.
s = maximum allowable working stress corresponding to the design temperature (psi),
E = efficiency of longitudinal joint,
c = corrosion allowance in inches.

D in inches = 12 × 33 = 396
+ 2 × corrosion allowance.
= 396 + 0.5 = 395.5 in.
(net or corroded I.D.)

s at 800 F. = 18% of minimum specified range of ultimate tensile strength at atmospheric conditions[1] ASTM-A-70 flange quality steel having a minimum of 55,000 psi tensile strength, s = 55,000 × .18 = 9900 psi.

E for flange quality steel (Group B) without a factor for stress-relieving or radiographing (which is impractical because of the field welding) is 78% (Pars E-318.2 and W-319 of API-ASME Code).

Substituting,

$$t = \frac{30 \times 396.5}{2 \times 9900 \times .78 - 30} + .25$$

$$= .773 + .25 = .998 \text{ or } 1 \text{ in.}$$

[1] See Fig. 1, API-ASME Code for the Design, Construction, Inspection and Repair of Unfired Pressure Vessels for Petroleum Liquids and Gases.

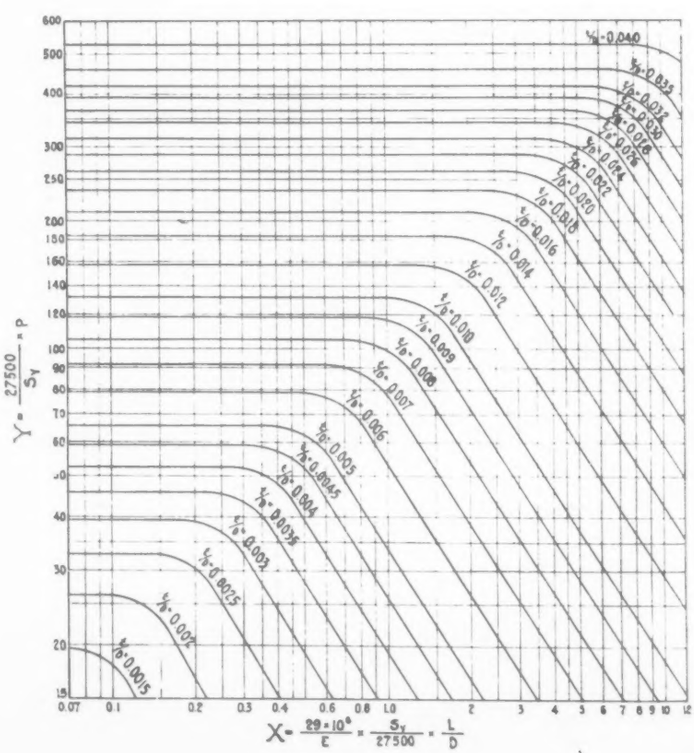


Fig. 43 Chart for determining shell thickness of unfired cylindrical vessels subjected to external pressure and having an L/D ratio equal to or smaller than 12

Thickness of hemispherical heads required to resist an internal pressure of 30 psi is calculated by the formula

$$t = \frac{p\,D_m}{4\,s\,E} + c$$

where D_m = mean diameter of the head flange; the other factors are the same as given in the shell formula above. Assuming t = 1 in. as in shell, and substituting,

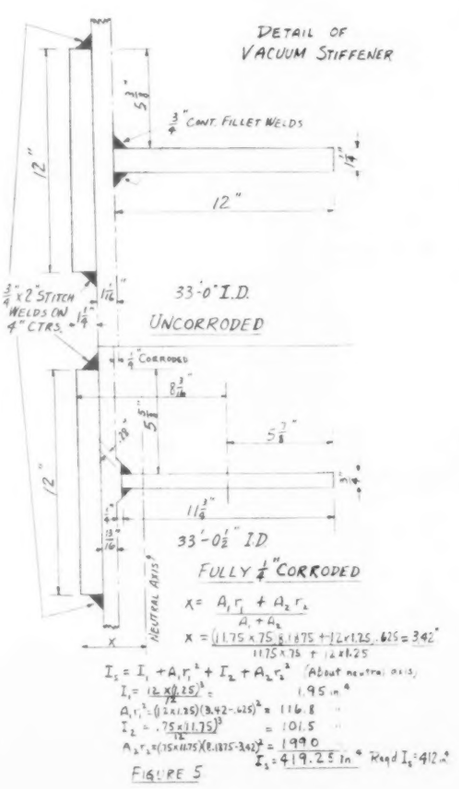
$$t = \frac{30 \times 397}{4 \times 9900 \times .78} + .25$$

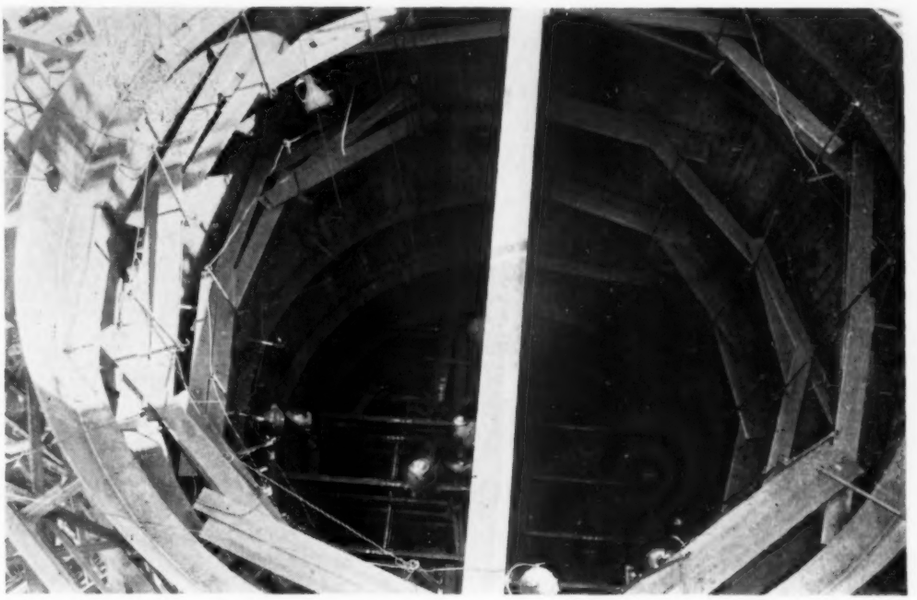
$$t = .386 + .25 = .636 \text{ in.}$$

Because of structural loads and stability against wind pressures, and for uniformity of construction, the heads are usually made at least as thick as the shell, even though hemispherical heads are subject to only half the hoop stress in the shell. A head of this size could not have been practicably fabricated out of plate thinner than that required for the shell without causing undue distortion during the welding process.

Design for Vacuum Operation

The thickness of the plate required to resist the external pressure (for vacuum operation) is based on the Tentative Draft of the Proposed Section for Fusion-Welded Unfired Pressure Vessels Subjected to External Pressure, which is being considered for addition to the API-ASME Code in the near future. The method of calculation proposed therein is similar to the one employed by the ASME Boiler Code—Sect. VIII for Unfired Pressure Vessels, except for adjustments for factor of safety and temperature.


DETAIL OF VACUUM STIFFENER
3/4" CONT. FILLET WELDS
12"
12"
3/4" x 2" STITCH WELDS ON 4" CTRS.
33'-0" I.D. UNCORRODED
1/4" CORRODED
33'-0 1/2" I.D.
FULLY 1/4" CORRODED
NEUTRAL AXIS
X = A1r1 + A2r2 / A1 + A2
X = (11.75 x 75 x 1875 + 12 x 1.25 x .625) / 11.75 x 75 + 12 x 1.25 = 3.42"
I = I1 + A1r1² + I2 + A2r2² (About neutral axis)
I1 = (12 x (.25)³)/12 = 1.95 in⁴
A1r1² = (11.75 x .25)(3.42 - .625)² = 116.8
I2 = (.75 x 11.75³)/12 = 101.5
A2r2² = (15 x 1.875)(1.875 - 3.42)² = 199.0
I = 419.25 in⁴ Reqd I = 412.4
FIGURE 5



View of the tower interior before attaching the top head. Main tray beams are already installed and the minor tray supports are in process of installation. Tray decks proper are to be installed after all supports are in place. The figures of the workmen at the bottom give an idea of the size of the tower

1. Where the t/D lines are horizontal, the formula used to determine the working pressure in this region is:

$$4p = \frac{2\,S_v\,t/D}{1.05}$$

This is merely the hoop stress formula with a 5% reduction factor applied to short vessels.

2. The region where the t/D lines are sloping applies to vessels which fail by instability at stresses below the yield point. The following modified Windenburg formula is used here:

$$4p = \frac{2.54\,E\,(t/D)^{5/2}}{L/D - 0.45\,(t/D)^{1/2}}$$

The calculated values of the abscissae and ordinates are based on the following variables in their respective equations shown on the chart:

(a) **Abscissae**

$$X = \frac{29 \times 10^6}{E} \times \frac{S_v}{27{,}500} \times \frac{L}{D}$$

(b) **Ordinates**

$$Y = \frac{27{,}500}{S_v} \times p$$

1—E = Modulus of elasticity as determined from another chart in this proposed Code at the design temperature. This chart, giving the change in modulus of elasticity with increase in temperature is based on the following formula:

$$E_t = E_{32}\left[1 - \left(\frac{t - 32}{1700}\right)^2\right]$$

Where E_{32} = E at 32° F., i.e., 29×10^6 psi°.

At 800°F. E = 23.2×10^6 psi.

2—S_v = yield point stress as determined from another chart at the corresponding design temperature.

This chart giving the change in yield point stress with the temperature is a horizontal line at 27,500 psi from 0° to 550° F, and from there a straight line slope to 9000 psi at 1000°F.

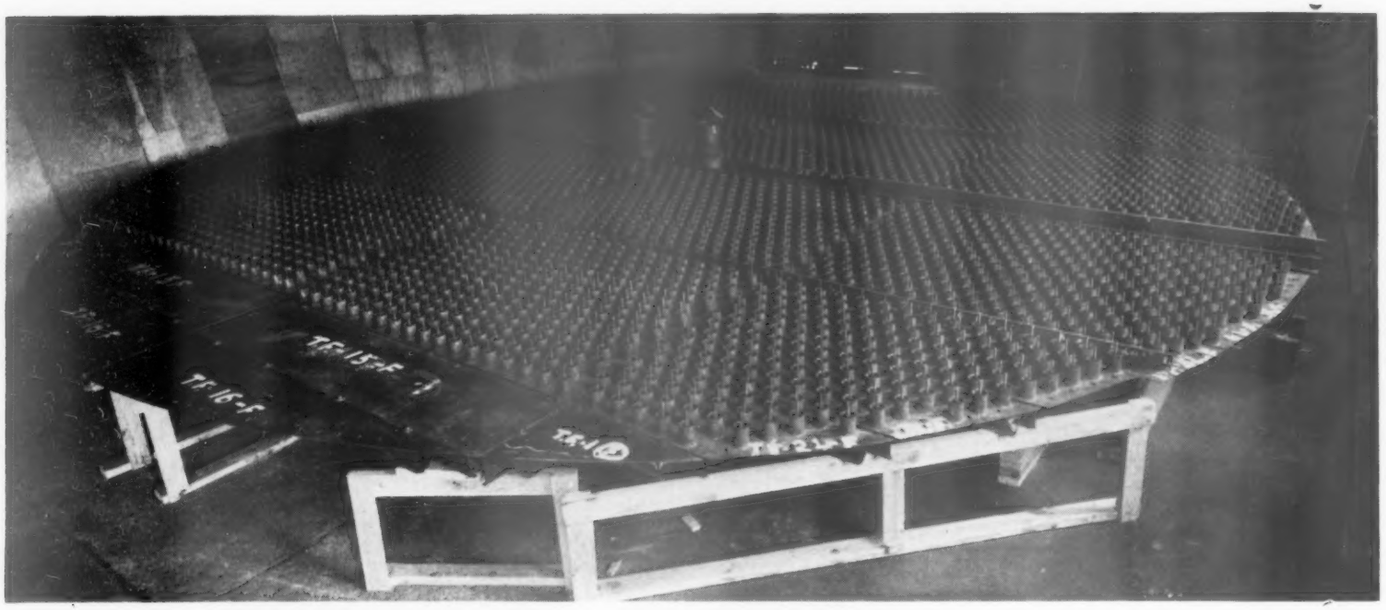
At 800°F. S_v = 17,200 psi.

3—L = length of vessel between tangent lines or between centers of circumferential stiffeners measured parallel to the axis, in inches. For this vessel, stiffeners were placed on 6 ft. centers to correspond to spacing of main tray support beams; therefore, L = 72 ins.

4—D = Outside diameter of shell, in inches. Assuming thickness is approximately 1 in. per internal pressure design, D = 396 + 2 × 1 = 398 in.

5—p = maximum allowable external work-

° — This equation was originally given in the A.S.M.E. Transactions for 1928 and is now published in "Piping Handbook" by Walker & Crocker. (McGraw-Hill Book Co.)



One of the twelve 33-ft. diameter trays set up in the fabricating shop. The deck is in sections, removable through 14 x 30-in. manholes installed in the shell at every tray interval

ing pressure, in psi. For vacuum operation the external pressure p = 15.

The values of the t/D lines on Fig. 43 are based on a factor of safety of 4 (per Fig. 1 of the API-ASME Code) and the following values of mild carbon steel at 60°F.:

Yield point S_y = 27,500 psi. This is the accepted value for 55,000 psi. minimum tensile strength steel in accordance with ASTM specifications.

Modulus of elasticity E = 29×10^6
Poisson's ratio μ = .25 (Constant)
Collapsing pressure = 4p
Working pressure = p

Then, for 800°F.,

$$X = \frac{29 \times 10^6}{23.2 \times 10^6} \times \frac{17{,}200}{27{,}500} \times \frac{72}{398} = .142$$

$$Y = \frac{27{,}500}{17{,}200} \times 15 = 24$$

The corresponding value of t/D on Fig. 43 = .002

$\therefore t = .002 \times 398 =$ .796
Adding corrosion allowance .25

Total thickness 1.046 or 1 1/8 in.

This is, therefore, the governing shell plate thickness. The heads are made the same for reasons of uniformity and as explained above.

Design for Vacuum Stiffeners

A standard formula for the buckling load of a circular ring under uniform external pressure is $q = \frac{3EI}{r^3}$ where q is the load per unit circumferential length of the ring and r is the radius of the neutral axis of the ring.

For safety in design the external load is increased 10%.

Calculations and tests show that the combined moment of inertia I of the shell and stiffener was anywhere from 30% to 70% greater than the I of the stiffener only. The lower limit of 30% was conservatively adopted, and a formula derived omitting the effect of the shell from the strength of the stiffener entirely.

Substituting in the above formula I = 1.3 I_s, 1.1 (4p)L = q, and D/2 = r, it becomes

$$I_s = \frac{0.140\ D^3\ pL}{E}$$

Where I_s is the required moment of inertia of the stiffening ring. Substituting the necessary values,

$$I_s = \frac{0.140 \times (398)^3 \times 15 \times 72}{23.2 \times 10^6} = 412 \text{ in.}^4$$

In order to avoid stresses due to differential expansion the outstanding member of the stiffener was to be attached to the inside of the shell (it would have been difficult to provide insulation around an external ring) and thus would have the same temperature as the shell to which it is attached. The final design and corresponding calculations are shown in Fig. 5.

Design of Supports

For a difference in temperature of approximately 700°F. between erection and operation, the tower would expand 1¾ in. in diameter, pushing each column at the tangent line out from the center by ⅞ in. Fixing the base of the columns by anchor bolts would, therefore, create high stresses in the columns and the attachment welding to the shell. Because of the large diameter and total weight of the tower, the over-turning moment due to a commonly specified 30 lbs./sq. ft. wind pressure on the projected area was not big enough to overcome the stability of the tower; hence the column bases need not be fixed. It was, therefore, decided to eliminate these thermal stresses by allowing the columns to expand with the tower, on 6-in. diameter steel rollers. The columns were designed on the basis of a complete hydrostatic test, with a total load calculated as follows:

	Approx. Wt., Lbs.
Tower shell, attachments & beams	800,000
Tower trays & minor supports	450,000
Water for hydrostatic test (58,000 cu. ft @ 62.4)	3,620,000
Insulation	80,000
Piping	20,000
Platforms	10,000
Booster pumps and barometric condenser	150,000
Total weight supported by colums	5,130,000

Because of the rollers, the columns were made as short as possible, in the form of brackets, just long enough to have the head clear the concrete ring. Most of the water load being only temporary, a stress of 15,000 psi. was used and resulted in a required area of 342 sq. in. Using 12 columns, each column stub required 28.5 sq. in. sectional area. This applies only to its unsupported length, confined to a few inches above the base plate which rests on three 6 in. diameter by 2 ft. long rollers.

At high operating temperatures, only a fraction of the liquid weight would be supported (5 in. on trays, or 340,000 lbs.) causing the stress to fall below the allowable at 800°F. The design was, therefore, safe for all conditions. The rollers were confined to radial movement

It Can't Be Done?

Step by step the forbidding sentence "It can't be done", is being erased from chemical thinking

For instance:

Chemistry textbooks for generations had taught that only a few limited fractions of petroleum could produce the 100-octane gasoline needed in unlimited volume by our fighting flyers

That belief didn't even slow up Universal research men They went ahead, discovered principles and developed new processes that multiply production of the precious aviation motor fuel in the very ways believed impossible

And that isn't all They developed processes to make the components of synthetic rubber from petroleum, too—better rubber than trees ever grew

So we will be freed forever from dependence on rubber trees, 10,000 miles from home

It's mighty lucky for our fighting men—for all of us—that Universal research men did not stop at the barrier marked—

"It can't be done."

OIL IS AMMUNITION—USE IT WISELY

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

in boxes anchored in the concrete foundation ring to prevent side slippage, and keep the center line of the tower stationary. The center line of the column stub bases coincides with the extension of the shell plate, i.e., 16 ft., 6 in. from centerline of tower.

Calculations determining the heat transfer from the shell into the support columns indicated that considerable thermal stresses would be set up in the welds attaching the columns to the head plate. In order to keep these stresses down, the following precautions were specified:

1—The temperature difference between the shell and the outside edge of the support is to be maintained as low as possible by means of heating coils fastened to the columns and connected before the tower has been brought up to operating temperature.

2—To facilitate the heat conduction from shell to supports, all plates and brackets are welded through their entire thickness, for their entire length of 12 ft.; 4 ft. 6 in. above the tangent line to the shell and 7 ft. 6 in. below the tangent line to the head, providing complete contact, and distributing the stress caused by the transfer of the weight from shell to supports over as large an area as possible. This also insures greater rigidity of shell and head at those points.

3—The column and roller bearing housings will be completely insulated, and enclosed in a No. 16 gauge steel casing.

4—The attachment welds will be mechanically stress-relieved by peening, i.e., tapping with a specified size air hammer to relieve locked-up stresses and close cracks. Thermal stress-relief may cause distortion preventing the careful fitting required by the close tolerances.

Proposed Method of Field Erection

The concrete foundation for the tower was designed for the same loading as the supports, and due to the low soil bearing pressure, piles were required. The top of the concrete ring, 3 ft. thick and 33 ft. mean diameter is 23 ft. above grade. The steel boxes housing the rollers are anchored in the top of the concrete ring so as to permit only radial movement of the rollers and tower. Using an allowable compressive stress of 625 psi for concrete, the base plate will be 24 in. x 30 in.

The heads are shipped to the site in 13 pieces each. The center, or crown piece, is approximately 10 ft. in diameter and formed into a spherical dish with a 10 ft., 6 in. radius. The other 12 pieces are in the shape of spherical segments resembling orange peels, with the edge tangential to the shell being 30° of a 33-ft. diameter circle, to the middle of which the support column stub is already welded. They are carefully formed with the aid of a template so that when tack-welded to the edge of the crown piece they form a 33-ft. diameter hemisphere.

The crown piece is lifted into place with a derrick into a carefully built-up crib inside the concrete skirt so that it occupies exactly its final position. Each of the 12 segments is then successively lifted into its proper place and tack-welded to the crown piece, with the column stub resting on the rollers. The segments are also tack-welded to each other as they fit into place to form the hemisphere. This is a delicate operation requiring extremely skilled workmanship. The top edge must then be perfectly round and horizontal; it is the tangent line, where the straight shell is welded onto the head. The tops of column brackets will be extending 4 ft. 6 in. into the air. They will act as guides for erecting the first course of the shell.

The 46-ft. high straight shell will be erected in 6 courses or rings, each of approximately 8 ft. height. Each ring will be of four 90° segments rolled in the shop with edges machined and grooved for welding. Each section has a guide lug tack-welded to it for the next course. This lug has a hole drilled in it so as to also serve as a lifting lug. It is then lifted into place and tack-welded to the section underneath, until the ring is complete; then the seams are completely double butt-welded. Thus the total number of feet of 1 1/6 in. thick seam welding is calculated as follows:

	Ft.
7—Circular seams 33 ft. diam.	= 728
4—Vertical seams 46 ft. long	= 184
2—Circular seams around crown piece 10 ft. dia.	= 63
24—radial seams in heads @ 21 ft. long*	= 504
Total lineal feet	= 1479

*Length radial seams $= \frac{\frac{1}{2}(33\pi - 10)}{2} = 21$

At 4.25 lb./ft. this requires 6300 lbs. of electrodes. This can be deposited at a rate of about 4 lb. per man-hour using a 3/8 in. rod, making a total of 1575 man-hours @ 1.25 = $1970.

The total cost per foot of 1 1/6 in. weld is therefore calculated as follows:

Direct Labor	$1970
Field equipment, power and supervision 60% of labor	1180
Cost of electrodes, 6300 lb. @ $0.10	630
Total Cost for 1479 ft.	$3780
	= $2.55/ft.

This figure would be extremely difficult to duplicate, much less surpass, by any other method such as riveting.

The 8 stiffeners are located so that each ring has at least, one which helps maintain the close out-of-round tolerance. The internal horizontal bar is flame-cut in the shop in 60° segments out of rectangular plates carefully laid out so as to leave a minimum of scrap, and as close to the exact diameter as possible, probably within 1/4 in.

After the first course of shell plates is erected and welded together, the horizontal line for the top of the stiffener bar is laid out by means of a transit to insure being within 1/8 in. of the same horizontal plane all around, and 1 1/4 in. x 12 in. triangular shelf brackets welded along this line on approximately 3-ft. centers, with 3/4 in. continuous fillets. The 60° sections of the ring are then laid on these brackets and butt-welded together to form one continuous ring no more than 1/4 in. out of round. The ring is then continuously welded with 3/4 in. fillets on both sides to the shell and to the brackets. This tends to draw the shell into the same close tolerance circle as the ring and insures that no part of the shell will exceed the 5/8 in. out-of-roundness specification.

The outside reinforcing band is then welded on with 3/4 in. stitch welds 2 in. x 4 in., to provide the additional shell rigidity required along that plane. The stiffener rings are spaced 6 ft. apart and so located that they also serve as seats for the 5 ft. 6 in. deep tray beams, which are bolted to them, additional brackets being welded to ring and shell at those points to transfer the load from the ring to the shell. The total welding per stiffener is thus approximately 480 lineal feet of 3/4 in. fillets, or 800 lbs. of welding wire. This is a total of 6400 lbs. for the 8 stiffeners required, the top and bottom ones not acting as beam supports.

This probably cannot be deposited at a rate exceeding 3 lbs./man-hour, making a total of 2133 man-hours @ $1.25 = $2665. Another method of attachment, such as riveting, would not only cost considerably more, but would not even be feasible unless considerably more steel were added in the form of angles and flanges. Even with additional steel, the tolerance requirement could probably not be met with riveting; welding would appear to be the only practical method of construction.

Strength of Welds

The strength of welds was carefully calculated per the API-ASME Code. While the ultimate tensile strength of weld metal is about 60,000 psi, it is only allowed the same tensile strength of the adjoining steel as given in the ASTM specifications. The efficiency of fillet welds according to the code for structural steel (Group C) without stress-relieving and x-ray is 51%. The allowable shearing stress is 0.8 of the tensile stress, allowing a stress of 55,000 × .18 × .8 × .51 = 4040 psi @ 800°F. for welds perpendicular to the load. For welds parallel to the load, the allowable stress is 75% of that, or 3030 psi. The area is measured along the throat of the weld, and 1/4 in. corrosion allowance must be deducted from all internal welds on permanent attachments, leaving a net corroded area for 3/4 in. fillets of .75 cos 45° — .25 = .28 sq. in./lin. in., or allowable stresses of 1130 lbs./lin. in. and 850 lbs./lin. in. for perpendicular and parallel loads, respectively.

Miscellaneous Internals

As indicated on the arrangement sketch (Fig. 1) below the 4 vapor outlet nozzles in the top head are 4 impingement baffles, or mist extractors, designed to trap any liquid particles that may tend to be drawn off with the overhead vapor. These consist of an intricate circular arrangement of vanes and baffles. Individual vanes and the bottom baffle were of welded construction, but bolted

to the welded top support baffle to permit removal and inspection.

The internal shells for the 24 ft. and 29 ft. diameter trays are of ¾ in. plates supported by ¾ in. gusset plates continuously welded to the shell plates and the top head. The main girder supporting the two trays in each section is a 46-in. deep, built-up beam of 1 in. web and 1 in. by 14-in. flange plates, designed and installed as the beam for the 33-ft. diameter tray.

The bottom 5 ft. of the 33 ft. diameter shell is the inlet or charge section. Here the partially vaporized charge comes in through three 16-in. tangential nozzles spaced at 120 degree intervals in the same horizontal plane. A wear plate ¾ in. x 5 ft. is stitch-welded 1 in. by 9 in. on both sides all around the circumference on the inside of the shell to prevent erosion and corrosion due to the tangential charge inlets. A large impingement baffle with 24 vane plates ½ in. x 2 ft. 6 in. x 5 ft. arranged in a 20 ft. diameter circle with a conical partition plate ½ in. thick bolted to a ring at the shell will prevent liquid in the form of mist from going up the tower. This baffle is completely welded except at points of support and attachment to shell where slotted bolt holes provide for expansion due to the high temperature of the baffle.

The shell for the bottom 14 ft. diameter trays is constructed similarly to the reduced sections in the top head, of ¾ in. plate bolted at points of support and attachment to the bottom head.

Hydrostatic Test

Erection of the tower shell on the foundation is scheduled to start about Sept. 15, 1942, with the tower to be completed about Jan. 15, 1943. The main tray beams are installed as the shell erection progresses in order to add stability to the structure and facilitate access to the interior. The minor tray supports and the tray decks proper are then to be installed before the top head is welded on in order to save time. The common method of installing trays through the manholes requires more time due to restrictions of space and number of men that can be used. After all internals except those in top head are installed, the top head is welded on, all manhole and connection covers are bolted and gasketed properly, and the entire vessel given a hydrostatic test in accordance with the API-ASME Code.

This requires a test pressure of 1.5 × design pressure, or 45 psi, measured at the top of the tower, and repeated at subsequent periods throughout the life of the vessel, i.e., until the ¼ in. corrosion allowance has been used up, when the vessel can still withstand such a test. Since it is more convenient to attach and read the gauge at the bottom, the hydrostatic head of liquid or 46 + 33 = 79 ft. of water = 35 psi is added to the test pressure at the top, giving a gauge reading of 80 psi at the bottom.

After the satisfactory completion of the hydrostatic test (showing no leakage) the tower is ready for the finishing touches to be applied before operation is started. The piping will be connected to the nozzles and the insulation applied, together with the welded attachment of steel platforms and access ladders. The unit is expected to be ready for operation about Feb. 1, 1943.

Proportionate Savings Due to Welding

The fabricator's price for furnishing all materials, completely fabricating, field erecting, and testing this tower shell and all internals except trays, as previously described, is $120,000—for an estimated weight of 800,000 lbs., or 15 cents/lb. The total estimated amount of arc-welding electrodes for the complete fabrication and erection is approximately 30,000 lbs.

Before the use of arc-welding became extensive in the construction of fractionating towers, riveting was the common method of construction. Assuming that this tower could practicably be of complete riveted design and construction and still maintain the rigid tolerance requirements, which is dubious, there would be considerable additional weight of material and cost involved.

The tentative API-ASME Code used in the design of the welded tower does not indicate any comparable method of design for riveted construction. A comparable code, the ASME Code for Unfired Pressure Vessels, requires that the efficiency of a riveted joint be sufficient to result in the same plate thickness as a welded joint.

The welded efficiency of 78% can presumably be duplicated by a riveted joint, with no change in shell thickness resulting. However, the butt straps, the angle flanges on the stiffeners and beams, the additional clips and gussets required for the complete riveted design would result in additional weight of metal of at least 15% or conservatively, 120,000 lbs. The tremendous number of rivets required for all the attachments on this tower would result in a higher labor cost per unit weight, due to the layout and drilling of holes, shop and field riveting, caulking edges and joints, and grinding heads of rivets to clear trays. After completion of erection there would probably be repairs necessary to straighten out attachments, meet tolerances, and repair leaks discovered in a hydrostatic test by seal welding.

The relative costs of the tower shell and attachments, exclusive of trays, may be estimated to be distributed as follows:

	Welded Tower			Riveted Tower		
Material	800,000 lbs. @ .05	$40,000	920,000 lbs.	@ .05	$46,000	
Shop prefabrication labor	@ .02	16,000		@ .025	23,000	
Shop overhead, 150% of labor		24,000			34,500	
Field erection and test	@ .025	20,000		@ .03	27,600	
Field equipment and supervision 60% of erection labor		12,000			16,560	
Total freight charges	@ .01	8,000		@ .01	9,200	
		$120,000			$156,860	
		= $0.15/lb.			= $0.17/lb.	

The saving of $36,860 = 23.5% of the cost of the riveted tower, or 30.7% of the welded tower. Tray savings have already been stated above.

Total Savings by the Company and Industry

The author's company, one of the major engineering firms engaged in the design and construction of refineries for war products such as toluene and high octane aviation gasoline is now constructing refineries with welded towers and tanks weighing approximately 20,000 tons @ $300/ton = $6,000,000 investment in welded pressure vessels. On the basis of the above comparison, the saving is 30.7% over riveted construction, or $1,840,000 total annual savings by the company in this phase of its war effort.

The total annual gross savings throughout the petroleum refinery and allied chemical industry is difficult to estimate; but considering that the total value of such construction in the present war effort is in the order of $1,500,000,000, it appears that the total volue of welded vessels is approximately $200,000,000, and that a savings in the order of $60,000,000 is a conservative estimate.

In addition to the above monetary savings, the use of arc welding results in a number of other advantages. The service life of welded towers is lengthened by welded replacement of corroded internal parts, which could not easily be replaced any other way due to limited means of accessibility.

Greater efficiency of fractionation, and therefore more useful products, is obtained by welding, since any other method would probably not meet the tolerance specifications.

The saving of 15% in weight of metal required indicates a greater efficiency in the use of our available resources and materials toward obtaining the desired result, and at this time is of supreme importance in our war effort. This economy of materials also leads to economy of time in construction; the 15% extra weight would presumably take at least 15% more time for erection. Actually, the saving in time, and the consequent start of production of the lube oils, is much greater than that, since riveted construction involves the handling of many more small parts, which by welding can be more efficiently prefabricated in the shop.

The fact that riveted construction in oil refinery equipment has become almost obsolete in the last 10 years by the use of arc welding is a certain sign that industry is quick to recognize and take advantage of these overall improvements.

Collectively, Chemical Field Seen Attractive To Refiners; Not in Making Single Products*

By John C. Walker**

An important point of view for oil companies considering the chemicals manufacturing field as a possible postwar development in petroleum refining is presented by this authority. The earlier part of his paper, omitted here, traces the developments in refining processes in which the composition of the oil has been chemically changed, which have paved the way for the manufacture of truly chemical products—Editor

° ° °

In all cases previously touched upon, the petroleum industry has appeared essentially as a hydrocarbon raw materials source for chemical, explosive, or rubber manufacture. In recent years the petroleum industry has considered the possibilities of undertaking, on its own behalf, conversion of its hydrocarbons to chemical products of greater value. Various petroleum companies have been very successful in such ventures and such products as alcohols, aldehydes, glycols, glycerin, ketones, soaps, ammonia, and many other materials have been produced with marked success.

In order to maintain a reasonable perspective and balance in considering the production from petroleum hydrocarbons of one of the 300,000 or more possible chemical compounds which may conceivably be made from these hydrocarbons, it should be remembered that very few *individual* chemicals can ever be sold or used, no matter how cheaply offered, in volumes comparable to those of the motor fuel markets. The keg or barrel is a larger unit for most chemical products than is the tank car for petroleum products, used as fuels, but often the barrel of chemical has more value on the market than the entire tank car of petroleum fuel. Individually, a chemical compound, even the larger tonnage items of the chemical industry, has but a limited tonnage market in comparison with motor fuel. Collectively, because of the vast potential number of valuable chemicals derivable from petroleum and natural gas, the field is enormous.

It seems fairly obvious, then, that conversion of petroleum or natural gas hydrocarbons to any single chemical or small group of chemicals can scarcely be relied upon to solve all the problems of large surplus production of petroleum experienced in times past or to provide an adequate outlet for all natural gas supplies which now have no pipeline connections. Collectively, the whole field of chemicals derived from petroleum offers intriguing possibilities and the potential values are almost unlimited.

Various companies in the petroleum industry are already manufacturing chemical products in one or more of the broad fields later outlined. Certain of the fields mentioned have not as yet been entered by petroleum companies.

1—Perhaps the earliest entrance of petroleum companies into the field of chemicals production involved the absorption of the ethylene hydrocarbons, contained in cracking still gases, in sulfuric acid to form alkyl sulfuric acids which are in turn hydrolyzed to secondary alcohols and recovered as such.

Ethyl, isopropyl, secondary butyl, amyl, hexyl, and higher secondary alcohols have all been produced in large volumes. These alcohols may be reacted with acetic acid to form the corresponding esters which are excellent solvents.

Isopropyl alcohol, so produced, may be catalytically converted to acetone, a valuable organic solvent. Mixed ketones such as methyl ethyl ketone and other ketones may be similarly produced.

In 1939 one petroleum company alone is reported to have produced a total of over 50,000,000 lbs. of various solvents of this character.

2—A second important field lies in the oxidation of petroleum hydrocarbons.

(a) Controlled partial oxidation, particularly of the gaseous hydrocarbons is accomplished by reaction with oxygen of the air. By this reaction methanol, formaldehyde, acetaldehyde, higher alcohols, acetals, ketones, and other products may be produced. A petroleum company pioneered in this field.

Formaldehyde is of particular importance in the synthetic resins field. Phenol, cresols, urea, melamine and other products are reacted with formaldehyde to form the thermo-setting or "Bakelite" type resin and also oil-soluble varnish resins.

Methanol produced by this process provides an excellent automobile radiator anti-freeze, may be converted to formaldehyde, used as an organic solvent, used in the refining of petroleum and for many other purposes.

Acetaldehyde may be converted to resins, acetic acid, etc.

(b) Gaseous hydrocarbons may also be converted by air and steam, using the water gas reaction, to produce hydrogen and carbon monoxide. These may be reacted to form methanol using high temperatures, pressures of the order of 4500 lbs. per sq. in. and suitable catalysts.

Similarly, hydrogen, produced by the water gas reaction from natural gas, may be reacted with nitrogen of the air under comparable pressure and temperature conditions, but with a different catalyst, to form gaseous ammonia.

The production of ammonia is exceedingly important to the war effort and several large plants for production of anhydrous ammonia by this process are now under construction. Ammonia is readily converted to nitric acid by catalytic oxidation with air. All military explosives contain nitrogen either as nitrate nitrogen, ammonia nitrogen, or both. Ammonia reacted with nitric acid produces ammonium nitrate which constitutes the bulk of such explosives as ammonal, amatol, etc.

Toluene, when treated with nitric and sulphuric acid, is converted to dinitrotoluene (D.N.T.) or trinitrotoluene (T.N.T.) both of which are vital military explosives. Published reports indicate that 250 to 300,000,000 gal. of toluene will be required annually in the present war. Though toluene has always been considered as a coal tar chemical, it is reported that only 25,000,000 gal. will be supplied by the coal tar industry. The balance will be produced from petroleum hydrocarbons by the petroleum industry.

3—A third important field is in the making —the nitro paraffins. A chemical company has pioneered in this utilization of petroleum hydrocarbons and now produces commercially nitromethane, nitroethane, and 1- and 2- nitropropanes, all of which are produced by the vapor phase nitration of propane.

This field has been barely scratched, but many important uses of this reaction and its products are already evident. It is believed that this field is particularly worthy of attention in view of the large potential production of ammonia which will be available when hostilities cease.

The nitro paraffins may prove of immense importance in the explosives field. Tetranitromethane, as an example, is an explosive of terrific power but thus far it has apparently not been developed as a military explosive.

4—A fourth large field lies in the chlorination of petroleum hydrocarbons. This involves the addition of chlorine to the hydrocarbon in many possible ways to produce many possible chlorine derivatives. A chemical company has also pioneered in this field.

From methane, for example, such familiar chemicals as chloroform and carbon tetrachloride are possible. Chlorinated hydrocarbons of rubber-like consistency are currently being produced, such as Pliofilm, Koroseal, etc.

The synthetic rubber, "Thiokol", is previously mentioned as requiring chlorinated ethylene in its production.

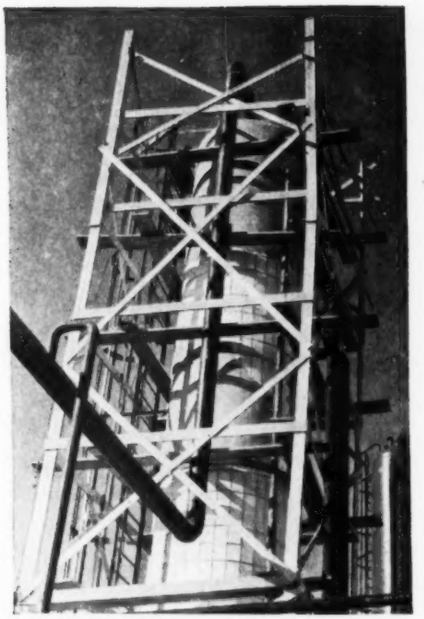
Various combinations of these previously mentioned fields are possible to produce such varied products as textile wetting agents, hard water soaps, laundry detergents, cosmetic soaps and creams. It is not inconceivable that fatty acids of good purity may be made and reacted with synthetic glycerin, made from propylene, to produce edible fats. Synthetic butter or synthetic lard is not at all beyond possibility.

*A portion of a paper presented before the Oklahoma Mineral Industries Conference, sponsored by the Oklahoma Geological Survey, Oklahoma City, Dec. 10, under the title "Chemical Trends in the Petroleum Industry".

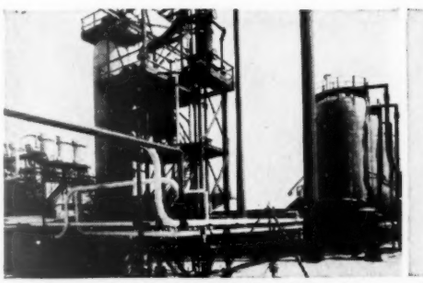
**General Superintendent, Chemical Division, Cities Service Oil Co., Bartlesville, Okla.

For lasting efficiency and maximum fuel savings

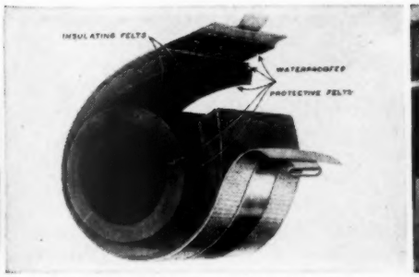
Johns-Manville Insulations



For All-Round Service at temperatures between 600° and 1900° F., J-M Superex Combination Insulation. Inner layer of J-M Superex, outer layer of J-M 85% Magnesia or Asbesto-Sponge Felted provide high heat resistance and efficiency. Blocks and pipe-covering.



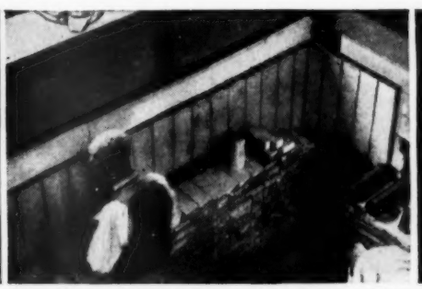
For Steam Lines up to 700° F.—J-M Asbesto-Sponge Felted Pipe Insulation provides high salvage value, unusual durability. 3-ft. sections. Thicknesses from 1" to 3". Integral waterproof jacket for outdoor use.



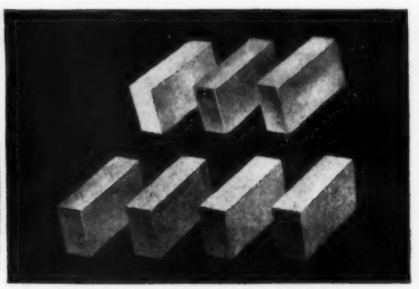
For Cold Water Lines—J-M Anti-Sweat Pipe Insulation. Designed to prevent condensation. In 3-ft. sections; thicknesses, ½" and ¾", solid construction; 1", 1½" and 2", broken joint construction.

For Boiler Drums, Water Walls, Tanks, Breechings—J-M 85% Magnesia Blocks, highly efficient at temperatures up to 600° F. Sizes 3" x 18", 6" x 36", 12" x 36", flat or curved. Thicknesses 1" to 4".

For Refrigerated Service—J-M Rock Cork. Basically mineral. Can't rot, won't support vermin or mold. In sheets, 18" x 36", 1" to 4" thicknesses. Pipe covering in 3-ft. sections with integral waterproof jacket.



For Furnace Insulation up to 1900° F.—J-M Superex Blocks, for years the most widely used block insulation at these temperatures. Sizes, 3" x 18", 6" x 36", 12" x 36". Thicknesses, 1" to 4", flat or curved.



For Furnace Insulation up to 2600° F. 3 types of J-M Insulating Brick, 4 types of J-M Insulating Fire Brick, are available. Furnished in all standard 9" shapes of the 2½" and 3" series, as well as in specials.

JM PRODUCTS

For details on these materials, and on the complete J-M Insulation line, write for catalog GI-6A. Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville INDUSTRIAL INSULATIONS

For every temperature . . . for every service

The Reduction of the Ash Content Of Residual Oils with Boric Acid*

By E. T. Scafe, K. F. Hayden and V. A. Kalichevsky**

A practical method is described for "de-ashing" residual fuel oils containing sodium salts resulting from the distillation of the crude in the presence of sodium hydroxide to minimize corrosive effects. These "soda tar" oils, as they are called, frequently cannot be marketed as acceptable fuel oils because of the alkaline residue deposited when they are burned.

In this method such oils are treated with boric acid and the acid recovered from the resulting sludge by acidification with sulfuric acid or sulfuric acid sludge. The treated oils are said to be free from moisture and to easily pass general specifications for industrial fuel oils.

This method would seem to be worth consideration by refiners with fuel oils with high ash content, as a means for making such oils satisfactory for marketing in the present period of high wartime demand for fuel oils. The cost of treatment is said to be low and the chemicals are available. Since the treatment is at low temperature and pressures, the equipment necessary could be built of improvised materials, such as old shell stills or other vessels. Socony-Vacuum Oil Co. owns patents on the process of treatment and interested refiners can secure additional information from the company.

PETROLEUM crude oil containing appreciable quantities of naphthenic acids are frequently distilled in the presence of sodium hydroxide in order to improve the quality of distillate fractions and minimize corrosion of equipment. The sodium salts resulting from this treatment are concentrated in the residuum of the still, which is commonly referred to as "soda tar", increasing its ash content. However, soda tar having a high ash content is not satisfactory for use as a fuel because on burning it deposits an alkaline residue that has a deleterious action on conventional furnace refractories. Hence, the reduction of the ash content of the soda tar is of considerable economic importance.

Several methods were proposed for lowering the ash content of petroleum oils such as washing with hot water under pressure[3] or treatment with acid and alcohol[2] but most of them are not commercially applicable because the use of aqueous reagents leads to formation of emulsions which are difficult to resolve[4]. For this reason in the search for new methods capable of removing sodium from the still residue, the use of water solutions in conventional plant equipment has not been considered desirable.

Removal of sodium without a simultaneous removal of naphthenic acid radicals present in the naphthenates may be accomplished by the use of acids stronger than naphthenic followed by the separation of the resulting sodium salts from the treated residuum. One of the important considerations in selecting the acid is its ability to form a sodium salt which is insoluble in the oil and which might be easily separated by settling on account of a high gravity differential. The acid should have little effect on the oil itself, be available in commercial quantities and be capable of easy regeneration because fuel oil is cheap and application of expensive treating methods for its improvement is impractical.

In the search for a refining agent capable of meeting the above requirements, boric acid has been found to be outstanding[5]. It easily displaces naphthenic acids from their salts, has for all practical purposes no effect on the oil constituents, and the sodium borates formed vary in specific gravity from 1.73 to 2.37 which insures a quick rate of settling.

The reactions involved in the de-ashing process employing boric acid may be represented as follows:

Boric Acid (Oil Insoluble) + Sodium Naphthenate (Oil Soluble) →
Sodium Borate (Oil Insoluble) + Naphthenic Acid (Oil Soluble)

Sodium Borate + Sulfuric Acid → Sodium Sulfate + Boric Acid

Assuming that sodium borate ($NaBO_2$) is the

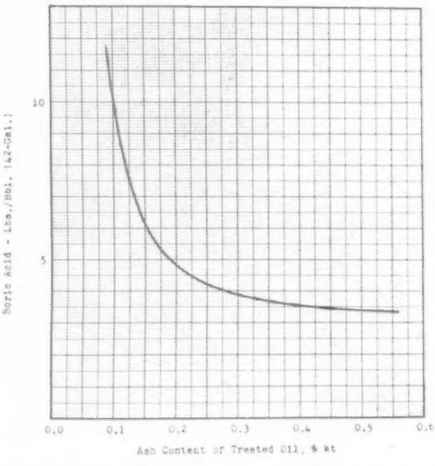


Fig. 1—Relation of ash content of treated fuel oil to quantity of boric acid used (Oil contained 2.05 lbs. NaOH per 42-gal. bbl.)

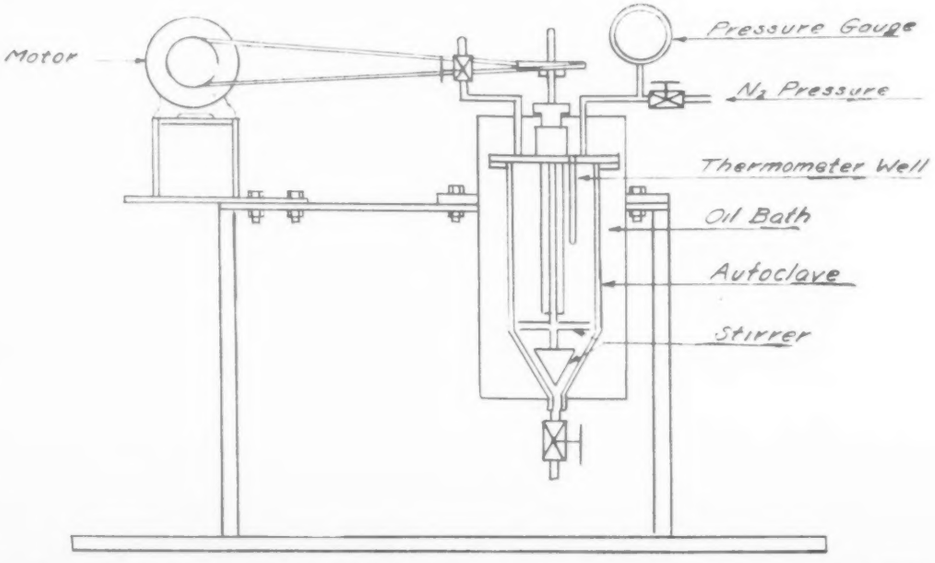


Fig. 2—Diagram of laboratory batch treating unit for processing soda tar with boric acid

*Presented before Division of Petroleum Chemistry, American Chemical Society, Buffalo, Sept. 10.

**Research and Development Division, Socony-Vacuum Oil Co., Inc.

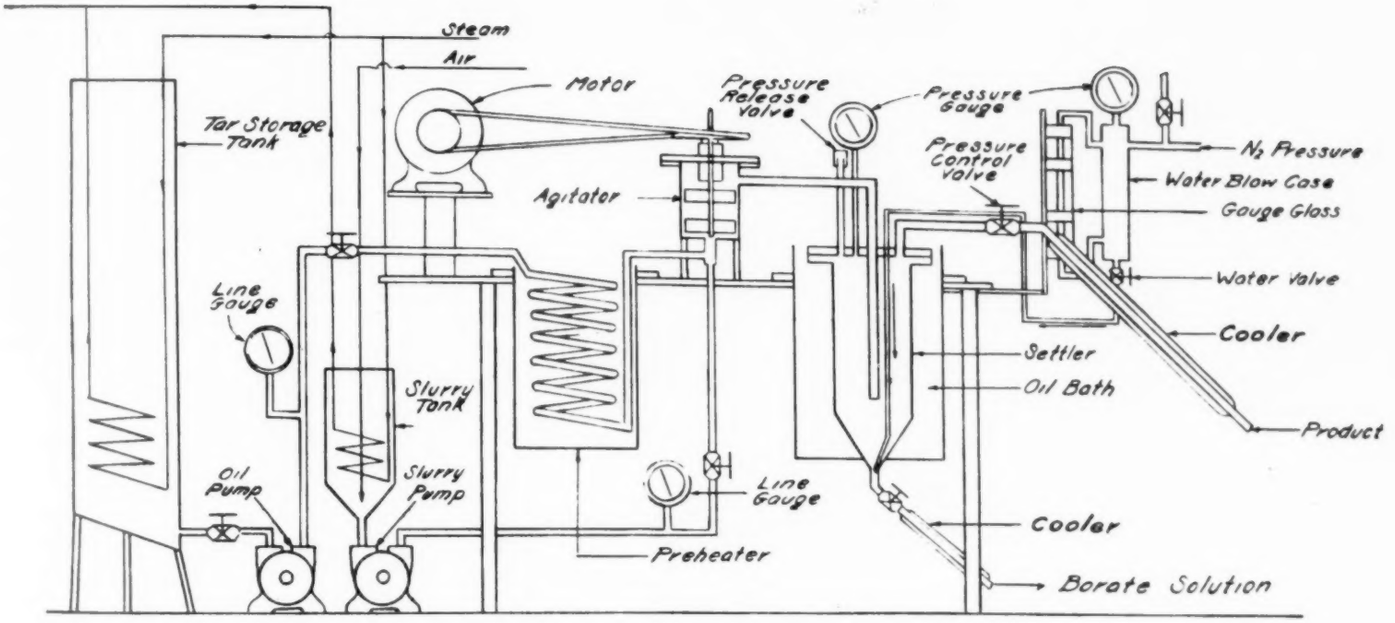


Fig. 3—Diagram of laboratory continuous unit for processing soda tar with boric acid

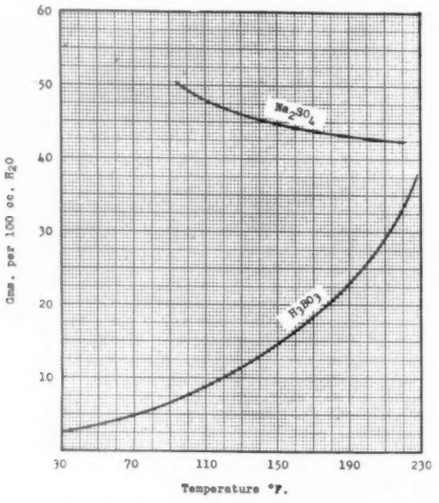


Fig. 4—Solubility of boric acid and sodium sulphate in aqueous solutions

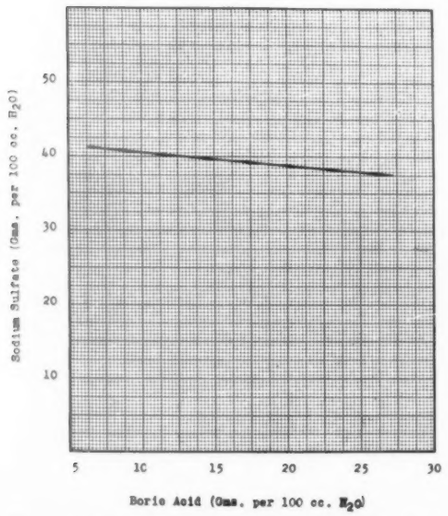


Fig. 5—Solubility of boric acid in solution containing sodium sulfate at 210° F.

Table I—Boric Acid Consumption

(Oil Contained 2.03 Lbs. NaOH Equivalent Per 42 Gal. Bbl.)

Operating Conditions

Temperature, °F.	400
Oil flow, gals./hr.	0.5
Pressure, lbs./sq. in.	250
Mixing time, min.	30
Settling time, min.	180
Purity of boric acid	99.5

Boric Acid Lbs./Bbl. (42)	Properties of Treated Oil—S.F.V. @ 122° F.	Gravity, °A.P.I.	B.S.&W. % Vol.	Ash % Wt.	Lbs. of Boric Acid Per Lbs. NaOH Equivalent
None	600	15.5	0.4	1.00	. . .
14.5	549	16.0	0.4	0.07	7.00
7.9	555	15.9	0.3	0.12	3.85
4.6	559	15.9	0.3	0.21	2.25
3.3	575	15.5	0.2	0.56	1.60

main reaction product, 1.5 lbs. of boric acid (H_3BO_3) is required for de-ashing a 42-gallon barrel of fuel oil of an equivalent sodium hydroxide content of 1 lb. per bbl. However, an excess of about 50% of boric acid is necessary for a more or less complete de-ashing of the oil as shown by the experimental data presented in Table I and Fig. 1.

The ash content of samples was determined by the A.S.T.M. Method of Analysis of Grease, D-128-37, which expresses the percentage of ash in the form of sulfates.

The equivalent sodium hydroxide content was determined as follows:

Approximately 5 grams of sample were dissolved in 50 cc. of benzene and mixed with 10 cc. of 95% ethyl alcohol and 10 cc. of water. The mixture was heated with vigorous shaking to 120°F. and titrated with 0.1 N. hydrochloric acid solution until the appearance of a permanent end point employing methyl orange in the alcohol-water phase as an indicator.

The soda tar samples were obtained from a commercial plant operating on a Coastal type of crude. In most of the experiments viscosity of the tar was reduced by blending with a gas oil of 36°A.P.I. gravity. Properties of soda tar and blended materials are given below.

	Soda Tar	Fuel Oil Blend
Saybolt Furol Vis.	1325-1400 @ 210°F.	300-830 @ 122°F.
Gravity, °A.P.I.	11.3-11.6	15.5-17.0
Ash Content (A. S. T. M. D-128-37), % Wt.	1.0-1.6	1.0-1.1
Alkalinity, Lbs. NaOH/42 Gal. Bbl.	2.0-2.8	2.0-2.4

Fluctuations in the ash content of the samples depended on the amount of sodium hydroxide added in the distillation process.

The initial experiments were made in a batch unit shown in Fig. 2 and consisting of a 1.5-gal. jacketed autoclave equipped with a mechanical stirrer operated at 400 r.p.m. The soda tar was charged to the autoclave, solid boric acid (commercial grade of 99.5% purity) was added, and the mixture was heated and agitated. The oil was allowed to settle at elevated temperatures and cooled to permit separation of the treated oil from the solidified borate-boric acid layer by decantation. The solidified layer was removed by dissolving in

Table II—De-ashing with Boric Acid by Batch Method

	Boric Acid Method			Sulfuric Acid Method
Properties of Untreated Oil				
Gravity, °A.P.I.	17.0	15.7	11.6	16.4
Viscosity				
S.F.V. @ 122° F.	297	700		309
S.F.V. @ 210° F.	...	...	1325	...
Ash Content, % Wt.	1.03	1.13	1.02	0.52
B.S.&W., % Vol.	0.4	0.4	0.2	0.2
Treating Conditions				
Temperature, °F.	400	400	360	350
Pressure, Lbs./Sq. In.	180	180	180	250
Mixing Time, Min.	30	30	15	35
Settling Time, Min.	60	60	120	270
Properties of Treated Soda Tar				
Gravity, °A.P.I.	17.3	16.0	12.0	16.4
Viscosity				
S.F.V. @ 122° F.	231	640		299
S.F.V. @ 210° F.	...	...	...	...
Ash Content, % Wt.	0.03	0.06	0.09	0.17
B.S.&W., % Vol.	0.2	0.2	0.2	2.1

Table III—Effect of Moisture Content of Recovered Boric Acid on Properties of Treated Oils

Operating Conditions

Temperature, °F.	400
Oil flow, gals./hr.	0.5
Pressure, lbs./sq. in.	250
Mixing time, min.	30
Settling time, min.	180
Boric acid added, lbs./bbl. (42)	5.2

Moisture Content of Recovered Boric Acid, % Wt.	Properties of Treated Oil: S.F.V. @ 122°F.	Gravity °A.P.I.	B.S.&W.	Water by Distillation	Ash % Wt.
Untreated Fuel	831	15.1	0.25	0	0.95
None	707	15.7	0.20	0	0.15
35	763	15.3	0.9	0.8	0.18
40	774	15.4	1.0	0.9	0.23

Table IV—Ash Contents of Oils Treated With Fresh and Recovered Boric Acid

Purity of Boric Acid, % Wt.	Lbs. Acid/lbs. NaOH Equivalent	Ash Content of Treated Oil, % Wt.
99.5	2.25	0.21
90.0	2.30	0.24

Table V—Methods of Agitating Boric Acid-Oil Mixtures

Operating Conditions

Temperature, °F.	400
Pressure, lbs./sq. in.	250
Oil flow, gals./hr.	0.5
Settling time, min.	180
Boric acid, lbs./bbl.	3.7
Viscosity, S. F. V. @ 122°F.	600-831

Method	Mixing Time, Min.	Speed of Stirrer, R.P.M.	Ash Content, % Wt. Untreated	Treated
Pump circulation	0.16	1,100	1.10	0.74
Paddle agitation	2	900	1.10	0.64
Paddle agitation	2	1,600	1.10	0.57
Paddle agitation	30	400	1.00	0.33*
Paddle agitation	30	700	0.95	0.26
Paddle agitation	30	1,100	0.95	0.24

*Estimated from Figure 1.

hot water. Compressed nitrogen was employed for maintaining pressure in the autoclave during treating and settling.

Typical results obtained from these treats are shown in Table II in comparison with those obtained by de-ashing the oil with dilute sulfuric acid. They indicate that the boric acid method is capable of reducing the ash content to a considerably lower figure than that obtained with sulfuric acid even with low viscosity oils. Moreover, the bottom sediment and water content of the sulfuric acid treated oils showed a very considerable increase after treatment, while that of the boric acid treated oils was frequently lower but never above the original figure.

The highly encouraging results obtained with the batch treats prompted the building of a continuous unit which is shown diagrammatically in Fig. 3. The unit consisted of a feed pump, a preheating coil, a mixing chamber and a settling chamber. The oil was continuously passed through the heating coils and into the mixing chamber, where it was agitated with the boric acid. A small amount of the oil charge was added to the boric acid to form a slurry in order to facilitate pumping. The oil was separated from the boric acid sludge in a settler. The treated oil overflowed from the settler through coolers into suitable receivers where continuous removal of the boric acid sludge was insured by leaching with a small stream of water introduced into the bottom of the settler. Typical results obtained with this continuous unit are given in Table I.

The results of this work showed that the treating and settling temperatures should be maintained at about 400°F. At this temperature the boric acid is in a molten state (melting point of boric acid is 365°F.) which permits its thorough mixing with the oil. Higher temperatures offer no advantage but necessitate the use of higher pressures due to the presence of small quantities of water in the system. Temperatures lower than 400°F. increase the settling time, particularly with the high viscosity oils. The pressure required for preventing the escape of water from the aqueous sludge and for avoiding dehydration of boric acid to boric anhydride is about 235 lbs./sq. in. at 400°F. The use of higher pressures serves no useful purpose.

The time required for completion of the reaction is governed to a great extent by the degree of dispersion of the molten boric acid in the oil, which in turn depends on the type and degree of mixing. The results presented in Table V show that with the mixer employed in this work about 30 minutes were required to obtain optimum results.

The settling time is influenced by the viscosity of the mixture at the settling temperature and by the degree of dispersion. Data indicate that under the conditions employed, the settling time of 180 minutes was ample for oils varying in Saybolt Furol viscosity from 600 at 122° F. to 1425 at 210° F.

The quantity of water necessary for leaching boric acid sludge from the settling chamber in a continuous unit is about 3 lbs. per pound of boric acid used. The use of excessive quantities of water should be avoided in order to facilitate the subsequent recovery of boric acid.

The recovery of boric acid is accomplished by acidifying the boric acid sludge with sulfuric acid or sulfuric acid sludge followed by recrystallization. Approximately 1.3 lbs. of 95% sulfuric acid or its equivalent is necessary for each pound of sodium hydroxide removed from the oil. The acidified spent boric acid solution containing sodium sulfate is kept at about 200°F. for approximately 60 minutes in order to effect separation of oily matter with which it is usually contaminated. After the oil is skimmed off, the solution is cooled to about 90°F. to precipitate most of the boric acid. This temperature was chosen to prevent simultaneous crystallization of sodium sulfate. The solubility characteristics of boric acid in water and in sodium sulfate solutions are illustrated in Figs. 4[1] and 5, respectively. The precipitate is separated from the remaining solution by filtration. This procedure yields wet boric acid containing approximately 30% wt. of the mother liquor. The recovered acid on moisture-free basis is thus composed of 91-92% boric acid and 8-9% sodium sulfate. The presence of water and sodium sulfate in the recovered acid does not interfere with the de-ashing process as shown by experimental data given in Tables III and IV.

The mother liquor is concentrated to 50-55% of its original volume and the precipitated sodium sulfate is separated by filtration. The remaining liquid is recycled in order to increase the boric acid recovery. Total recovery of boric acid is approximately 90% wt. of that originally charged to the unit.

Acknowledgement

The authors wish to express their appreciation to Dr. J. B. Rather, in charge of the General Laboratories of the Socony-Vacuum Oil Co., Inc., for permission to publish this manuscript.

Bibliography

(1) Dictionary of Chem. Solubilities (Inorganic) Corney-Hahn; 2nd Ed. 1921.
(2) Fischer, H. G. M., Can., 281,168, June 19, 1928.
(3) Hendrey, W. B., U. S. 2,133,094, Oct. 11, 1938.
(4) Kalichevsky, V. A. and Stagner, B. A., Chemical Refining of Petroleum, Revised Edition (1942), p. 163.
(5) Scafe, E. T., U. S. 2,222,596, Nov. 26, 1940.

with 50% less
STRATEGIC
MATERIALS

THERMAL CRACKING UNITS...TOPPING UNITS

Can be Converted to

THERMOFOR CATALYTIC CRACKING PLANTS*

With a Saving of 50% IN STRATEGIC MATERIALS

T.C.C. is the answer to today's problems: a greater supply of source materials for 100 octane gasoline, Butadiene and Toluol . . . the scarcity of strategic materials . . . the trend in aviation gasoline specifications.

— The addition of reactor, thermofor kiln, catalyst elevators and facilities will convert any existing thermal cracking unit or topping unit to a Thermofor Catalytic Cracking Plant—with a saving of 50% in strategic materials and a comparable saving in investment cost (over a complete plant).

— In the handling of corrosive stocks, less alloy material is required because of the smaller reactors and lesser amount of internals.

— In the construction of complete T.C.C. plants, new design further reduces requirements for structural steel and other strategic materials.

— Recent T.C.C. runs show once-through motor gasoline yields on gas oil up to 62% and new specification aviation base stock up to 35% (on gas oil).

Get all the facts on T.C.C.

THE LUMMUS COMPANY • 420 Lexington Ave., New York
600 S. Michigan Avenue, Chicago, Ill.
2315 Tangley Road, Houston, Texas
Florida, 671, Buenos Aires, Argentina
634 S. Spring Street, Los Angeles, Calif.
70 Barn Hill, Wembley Park, Middlesex, England
* Licensed by Houdry Process Corporation

LUMMUS

PETROLEUM REFINING PLANTS

LUBE OIL PRODUCTION INCREASED 60%

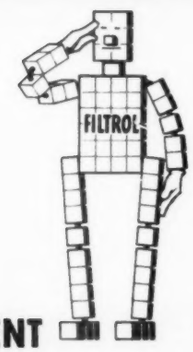
AND NO NEW EQUIPMENT REQUIRED

A Mid-Continent refinery was swamped with rush orders for high quality specification lube oil. These specifications slowed down plant production to less than normal, and even so, barely met quality. The situation called for quick action to meet war-time demands.

A Filtrol service engineer studied the problem. Changes were made in the acid treating procedure and contacting technique and the use of Super Filtrol was instituted. The result: improved quality of the oil to specification *plus* and stepped up production to 160% of the normal plant capacity. The economy effected amounted to more than the total cost of the clay originally used, and the rush orders were filled.

This is but one of the many production-increasing jobs Super Filtrol is doing to get more and better oil —oil that is the ammunition needed to help America win this war. Why not let Filtrol Service help you?

FILTROL CORPORATION
General Offices: 634 S. Spring St., Los Angeles, California
Plants: Vernon, California Jackson, Mississippi



Super FILTROL

THE ACTIVATED AGENT SPEEDS PRODUCTION, CONSERVES MATERIALS

Propose New Standard Tests To Indicate The Acidity In Lubricating Oils

TWO new methods for determining the neutralization number, or indication of acidity, in petroleum lubricating oils have been developed by Committee D-2 on Petroleum Products and Lubricants of the American Society for Testing Materials. They are now tentative standard methods of test of the society, for general use by oil companies[1].

One method, electrometric titration, uses a potentiometer, or voltmeter, to register the change which takes place in electrical potential between 2 electrodes immersed in a sample of oil while a solution is being added which neutralizes the acid or other alkali consuming substances. The second, a so-called "rapid" method, is a revision which shortens the former colorimetric titration method D-188-41T. In this the observer detects by change of color of an indicator in the sample when neutralization has taken place. In simplest terms, neutralization number is the number of milligrams of the reagent required to neutralize 1 gram of the sample of the lubricating oil.

This test was originally developed to show the extent of removal of refining acids, alkalies and other undesirable constituents in the finished lubricant[2], but modern refining processes and improved treating methods have largely done away with the need for this test on new oils, and its principal use now is in studies of the extent of oxidation in used motor oils.

This condition of oils in service has become more complex because of the great variety of additives now used in oils and because of alloy metals in bearings. The report of Subcommittee XIII of D-2 on Neutralization Number and Saponification, of which H. P. Ferguson, Cleveland, Standard Oil Co. of Ohio, is chairman, defines the present scope of the neutralization tests as follows:

Defines Scope of Tests

"This method of test is designed to indicate in petroleum products and lubricants and compounded products the presence of organic constituents having acid or basic characteristics and the contamination by strong bases and strong acids. The compounds present in used oils that may consume caustic include organic and inorganic acids, phenolic compounds, lactones, resins, and many inhibitor and detergent addition agents. The compounds in a used oil that may consume acid include organic and inorganic bases, amino compounds, soaps and many inhibitor and detergent compounds. No general relationship between corrosive acids and neutralization number is known."

In discussing results by the 2 tests, the report states that in the case of new oils and slightly oxidized oils the results are comparable. However, in the case of severely oxidized oils, the results obtained by the colorimetric method are usually lower, both methods simply serving to indicate the rate of change of oxidation. The potentiometric method is to be preferred in the case of those oils which form stable emulsions.

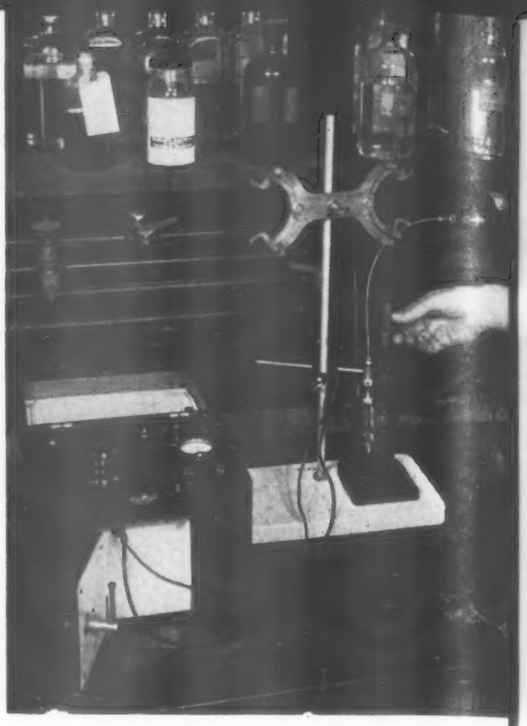
The method using potentiometric titration, for the most part developed in the laboratories of Shell Development Co. at Emeryville, Cal. in cooperation with Subcommittee XIII, is designed to eliminate many of the objections of the older methods using conventional titration. It has been adopted as a tentative standard (Method D664-42T) because further developments are in progress or in prospect; however, revisions are anticipated more in line of apparatus specifications than in the basic method itself.

Eliminates Eye Defect Errors

The electric method permits elimination of the operator's eye-response factor in detecting color change, because neutralization points are determined from a plot of potentiometer or voltmeter readings against burette readings. Even a totally color-blind person will have no difficulty with this method, since all he must do is read the instruments. The conventional colorimetric titration procedure has been retained, also as a tentative standard method (D663-42T), because, according to Subcommittee XIII, it requires less time and less expensive equipment than the potentiometric or electrometric method, and is entirely suitable for new oils not containing additives and slightly oxidized oils, such as turbine oils, which do not interfere with the indicator color.

There has been considerable investigation as to just what "neutralization number" actually measures. The test was first instituted to determine the presence of sulfuric acid and sodium hydroxide left in the oil after refining[2,3].

Later the test also was taken to indicate, in the case of a used oil, the degree of deterioration (oxidation) of the oil. At the present time, it is used to indicate the presence of strong acid (sulfuric) or strong base (sodium hydroxide) and, more generally, as a tool for the determination of the general trend of oxidation. But the test should not be considered in a specification as determinative of the degree of oxidation.[4]



Setup of apparatus for determination of neutralization number by potentiometric titration. Box at left is pH' meter; center shows titration cell containing electrodes, burette, and stirrer-paddle assembly; variable-speed stirrer motor is at extreme right, above operator's arm (Courtesy Standard Oil Co. of Ohio)

Explain Neutralization Number

Neutralization number is a composite measure of many different chemical compounds, it is pointed out by Subcommittee XIII. Mougey and Moller[5], after Davis[6], say "neutralization number is a complete measure of many different things, including the amounts of certain inhibitors, and the fact that an oil may have a large neutralization number does not mean that the oil contains any free acid; and a neutralization number, even if it is due to free acid, is not of necessity any indication as to whether or not the oil is corrosive to copper-lead bearings." Burwell[7] and King[8] have shown that alkali-consuming products in oxidized mixtures are more complex than simple acids and esters and that oxidation products may be of real benefit in the improving the "oiliness" of an oil.

Another indication of non-specific measurement is obvious from a study of Table I, which shows basic and acidic neutralization numbers determined by electrometric titration of 10 new oils. It should be noted that each of these oils is a "good" commercial product; some of them have been approved for service use by certain of the armed forces, and by engine manufacturers.

Dual Nature Illustrated

The dual nature of the neutralization number also is well illustrated in that some have both acid and alkaline neutralization numbers. This

1—Details of test procedure by the 2 methods are contained in A.S.T.M. Standards on Petroleum Products and Lubricants, October, 1942, the annual report of A.S.T.M. Committee D-2 on Petroleum Products and Lubricants. (Neutralization Number of Petroleum Products by Color-Indicator Titration, Tentative, D663-42T, pg. 251; Neutralization Number of Petroleum Products by Electrometric Titration, Tentative, D664-42T, pg. 255). The former color-indicator method of test, D-188-41T, has been dropped. Separate copies of each test method can be secured at nominal cost from the headquarters of the society, 260 S. Broad St., Philadelphia.

2—Clower, J. I., Lubricants and Lubrication, 1st Edition, p. 114-16 (1939).

3—Thomsen, T. C., The Practice of Lubrication, p. 62-3 Third Edition (1937).

4—Report of Committee D-2, Subcommittee XIII on Neutralization Number and Saponification, A.S.T.M. Standards on Petroleum Products and Lubricants, Sept. 1941, p. 2-3.

5—Mougey, H. C., and Moller, J. A., SAE Journal, 50, p. 429 (1942).

6—Davis, L. L., A.S.T.M. Bulletin, Dec. 1941, p. 13.

7—Burwell, A. W., Ind. Eng. Chem., 26, p. 204 (1934).

8—King, R. O., J. Inst. Petroleum Tech., 20, p. 97 (1934).

Table I—Neutralization Numbers by Potentiometric Titration*

Oil No.	Acid Neutralization No. Total Acid	Acid Neutralization No. Strong Acid	Base Neutralization No. Total Base	Base Neutralization No. Strong Base
1	0.00	None	0.03	0.00
2	0.38	None	1.24	0.56
3	0.40	None	9.72	8.85
4	1.32	None	2.11	0.00
5	1.48	None	2.05	0.00
6	1.89	None	1.40	0.00
7	2.79	None	2.15	0.00
8	1.86	None	0.03	0.00
9	3.18	None	2.11	0.00
10	1.54	None	9.88	6.64

*Courtesy Subcommittee XIII of A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, H. P. Ferguson, chairman.

concentrations in the solution into which the electrodes are immersed. This difference in potential may either be expressed in volts or in pH' (pH' is defined as the $\log_{10}$ of the reciprocal of the hydrogen ion concentration). There are several types of pH' meters commercially available.

The 2 electrodes, one a calomel electrode and the other a glass electrode, are connected to a suitable pH' meter or voltmeter and immersed in the sample. Provision is made for vigorous stirring of the sample during titration. The initial pH' or voltage is read from the meter, after which small, known volumes of titrating liquid (acid or alkali) are added, the meter reading being determined as soon as equilibrium is established after each addition. When the titration is completed (pH' has ceased to change by less than 0.1 unit—0.005 volt—per 0.1 ml. and the pH' is above 11.0), the burette readings are plotted against the corresponding pH' (or volts) and inflection points indicating neutralization that occur in the neighborhood of pH' scale readings of 4.0 and 11.0 are marked. The milliliters of potassium hydroxide or hydrochloric acid used to reach each inflection point are then determined from the curve and used in the calculation of results.

Table II—Neutralization Number of Lubricating Oils by Various Methods

	A°	B°	C°	D°	E°	F°
	Sample 4001					
Average°°	0.56	0.91	1.00	1.09	1.01	1.11
Average Deviation	0.06	0.21	0.20	0.09	0.02	0.20
	Sample 4002					
Average°°	0.28	0.34	0.38	0.35	0.31	0.35
Average Deviation	0.03	0.05	0.08	0.02	0.02	0.03
	Sample 4003					
Average°°	0.07	0.05	0.06	0.06	0.06	0.10
Average Deviation	0.01	0.013	0.02	0.013	0.015	0.044
	Sample D 9-40-1					
Average°°°	0.44	0.42	0.46	0.45	0.42	0.38
Average Deviation	...	0.02	0.008	0.028	0.017	0.06
	Sample D 9-40-2					
Average°°°	0.92	0.90	0.95	0.97	0.96	0.96
Average Deviation	...	0.02	0.04	0.09	0.07	0.08
	Sample D 9-40-3					
Average°°°	1.71	1.60	1.52	1.55	1.56	1.64
Average Deviation	...	0.06	0.12	0.14	0.04	0.13

° A is the present tentative standard color-indicator method D663-42T.
° B is a former method, D188-27T, by swirling the sample.
° C is former method D188-27T, by shaking the sample.
° D is method published as information in 1940, to replace D188-27T as published.
° E is method published as information in 1940, with one reheating of sample.
° F is present tentative standard electrometric method D644-42T.
°°Average of tests in 7 laboratories.
°°°Average of tests in 4 laboratories.

indicates that some, at least, of the compounds reactive to the testing reagents apparently are amphoteric in nature, while others are either acidic or basic, but not amphoteric. One plausible explanation of this apparent amphoterism is that certain additive molecules may be "doubly reactive". That is, one "end" of the molecule is inherently acidic, and therefore will react with potassium hydroxide; while the other "end" of the molecule is inherently basic, and therefore reacts with sulfuric acid. It is well known that some additive molecules and wetting agents have one "end" of such structure and polarity that it will be attracted to a metallic surface, while the other "end" will be attracted to, or be soluble in, "straight" mineral oil.

Subcommittee XIII has been studying for a number of years the variables affecting results obtained in determining neutralization number. Data accumulated show that time, degree of agitation, strength and type of solvent, and strength of acid and alkali all play their part in reproducibility of results.

One serious difficulty in determining neutralization number in the past has been the detection of indicator-color change during titration, especially when highly-colored oils were being tested. This is because of the reflection and re-reflection of the oil color in the extracting liquid being titrated or, even worse, not infrequently because of the solubility of some of the colored bodies in the extraction medium itself.

The potentiometric method makes use of the well-known change in electrical potential between two electrodes which exists with different hydrogen ion (or different hydroxyl ion)

Prescribe Exact Specifications

Repeated tests in many laboratories have indicated to the subcommittee that variation in dimensions and types of electrodes, as well as in volt- or pH'-meters, will affect the results obtained; therefore the methods prescribe precise specifications. The same may be said for control of other variables, such as time, concentration of reagents, degree of heating and degrees of agitation of sample, whether titration is colorimetric or by the potentiometric method.

In the so-called "rapid method", the main change from the former method has been to shorten the time of titration by speeding up the time between addition of increments of acid or alkali, use of a smaller sample, and by eliminating the final heating. There are other minor changes in the preparation of certain reagents and certain procedural details. There is no titration with methyl orange as indicator.

Subcommittee XIII says that results by the 2 methods, potentiometric and "rapid", will not necessarily compare—mainly because it has not been shown precisely what neutralization number measures. To this may be added the difficulty in determining the end point by the conventional colorimetric titration and the very fact that the indicator reagents are of themselves weak acids or alkalies, exhibiting their color change over a range of pH instead of at a single, definite value.

Table II shows neutralization number as determined by various methods of test. Work was done in from 4 to 7 different laboratories on 6 samples. Since this table was first published, the "rapid" method has been accepted as a tentative standard as Method D663-42T. The potentiometric method also has been published as a tentative standard (Method D664-42T).

The potentiometric method of test is now being used in Standard Oil Co. (Ohio) laboratories as a research tool; also for determining neutralization number of heavy duty oils and used oils for which results cannot be determined by the colorimetric method. However, 90% of neutralization numbers are determined by the colorimetric rather than the electrometric method—when it can be used—because of the former's favorable time factor. Neutralization numbers are not run on heavy duty type oils as a control test.

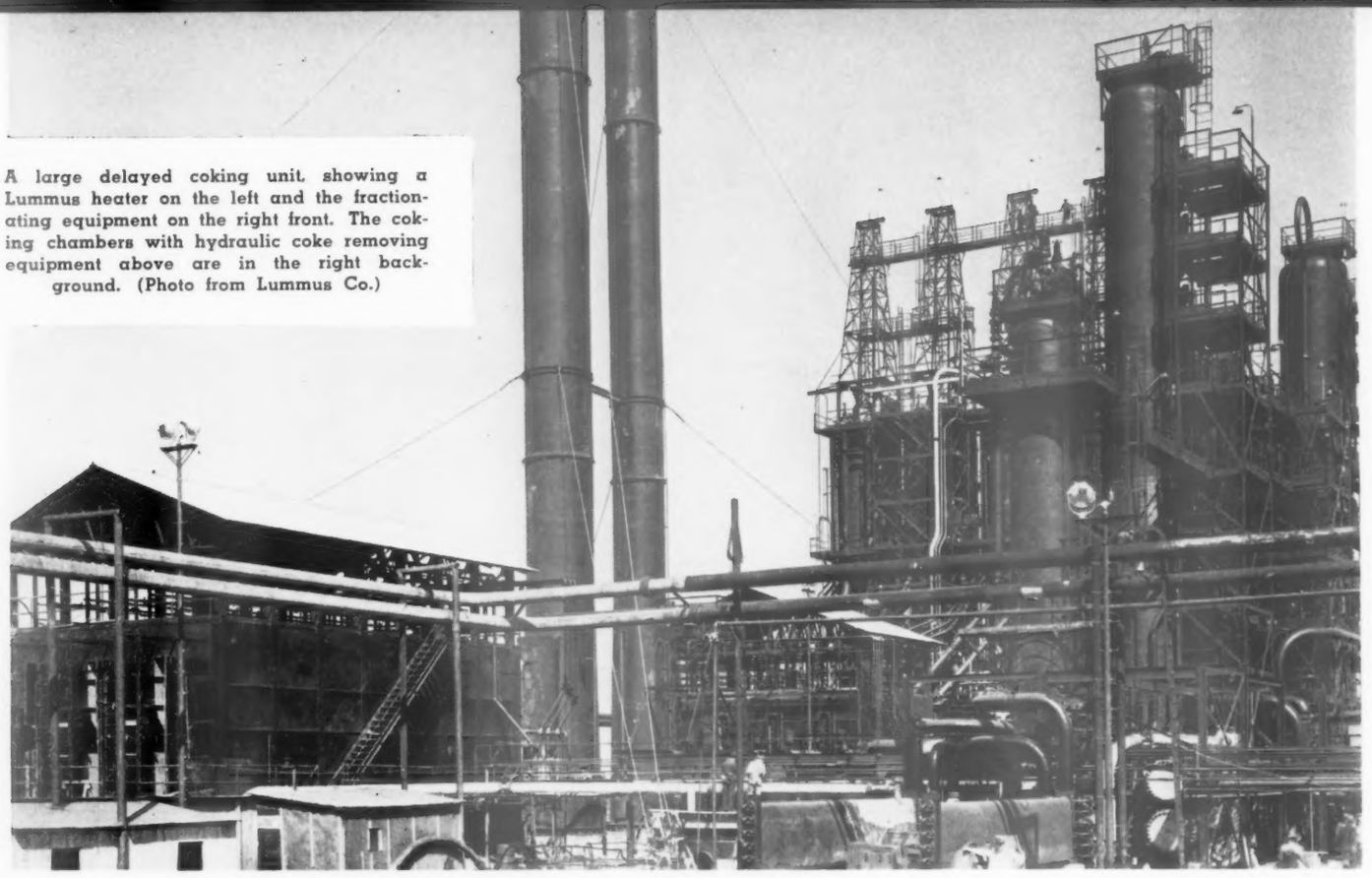
It is not difficult to train a non-technical employe of the caliber usually found in an oil company testing laboratory to perform either the colorimetric or the electrometric procedure in determining neutralization number. Any graduate chemist should be able immediately to understand and follow the procedure.

A pH' meter, with its electrode system, is classified as a delicate instrument, costing in the neighborhood of $200. Carefully handled, there is no reason for breakage or damage, and necessary replacement costs should only include potassium chloride for the calomel electrode, a buffer solution for standardizing the glass electrode, and batteries for the meter itself.

The only other equipment and reagents required are common to any oil-company laboratory and relatively inexpensive. They include suitable burettes for measuring the reagents used in the titration, the chemicals required for the titrating reagents, a good mechanical stirrer with provision for variable-speed, balance for weighing sample and reagents, beakers to form the titration cell and a suitable titration stand to support the titration cell, burette, stirrer and electrode system. The setup to perform the test should not require more than 3 sq. ft. of space on a table-top. Approximately $250 should be adequate to equip an oil company laboratory to use the electrometric method.

Authorities say it would be inadvisable, economically, for consumers to use the neutralization number test to indicate when motor oils should be changed, for results from this test alone are not adequate for this purpose.[9] It has been said that there is no test, other than performance and experience, which will indicate when an oil should be changed, although efforts of many research organizations have been directed along this line.

[9] Davis, L. L., Lincoln, B. H., Byrkitt, G. D., and Jones, W. A., Ind. Eng. Chem., 29, pp. 343-44 (1941).



A large delayed coking unit, showing a Lummus heater on the left and the fractionating equipment on the right front. The coking chambers with hydraulic coke removing equipment above are in the right background. (Photo from Lummus Co.)

Seek Maximum Yield of Petroleum Coke

Little possibility for increasing the production of petroleum coke, now among the critical war materials, by the use of idle or converted refinery equipment, or by any other means than running present coking units at maximum capacity, is seen by the oil companies manufacturing this petroleum product.

A limitation order affecting the delivery and use of both raw and calcined petroleum coke was issued last fall by the Office of Price Administration to the refiners with coking facilities. In a later order from the petroleum coorinator each refiner was asked to produce the maximum amount possible from present facilities, also to reduce or eliminate the use of caustic soda or lime in the production of coke to the greatest extent possible without causing corrosion of equipment. This latter affects the ash content of the coke.

Quality Petroleum Coke Essential

"Raw petroleum coke of high quality is an essential raw material for the manufacture of electrodes and other critical materials," the order stated. "The present supply and production is insufficient to meet present and projected requirements. In part at least this deficiency can be corrected by the fullest capacity operation of existing coking facilities in certain refineries best adapted to the production of such coke from the standpoint of the availability of raw materials, character or equipment and operation, accessibility to transportation and effect on the production of other war products".

Three large refiners have commented to NPN on problems in connection with production of maximum volumes of coke. One refiner stated:

"It has been our experience that the maximum yield of coke is usually obtained from units which operate at pressure substantially above atmospheric by selection and processing of feed stocks which result in the units being operated at minimum coke drum cycle.

"Regarding the use of idle equipment to increase coke production, undoubtedly a critical and detailed review of plant operations would be required before any decision could be reached on this joint and therefore those refiners having such equipment would be in the best position to judge the possibility of utilizing these materials in any expansion program.

"With regard to methods for increasing coke output without loss of fuel oil production, the heavy stocks which now go to make up a large part of fuel oil production also represent the best potential stock for maximum coke production and therefore it would be difficult to increase coke output appreciably without proportionately decreasing fuel oil production."

Another refiner gave the following suggestions for improving yield of coking units, pointing out, however, that the adoption of the suggestions would involve substantial alterations or additions to existing equipment:

(a) Continuous, rather than batch coking.

(b) Use of hydraulic, rather than cable or other types of de-coking.

(c) Use of refractory heat carrier recycle fraction.

(d) Charge heavier and more asphaltic residuum.

Gives Method for Starting Up Unit

Another oil company stated as follows on the method for starting up coking units which had been down:

"Standard accepted procedure for starting these units is by circulation of gas oil, followed by cutting into the residual oil charge tank as soon as the unit is up to approximately operating temperature. This ordinarily requires 12 hours and our experience has shown that any attempts to shorten this period requires excessive firing of the furnaces with resulting damage to furnace brickwork. Experience indicates that from an over-all standpoint this 12-hour starting up period is the most advantageous, as a shorter period results in excessive maintenance with less monthly on-stream time."

Since coke production is directly proportional to the amount of oil charged, the only method for increasing coke production is to run at maximum capacity, this company stated.

This refiner also suggested that in certain cases idle shell still equipment might be operated as old time coking units and would produce a satisfactory grade of coke. In general the possibility for converting other refinery equipment to coke manufacture is entirely dependent on equipment in the individual case, it was stated.

NPN SEMI-ANNUAL SUBJECT INDEX

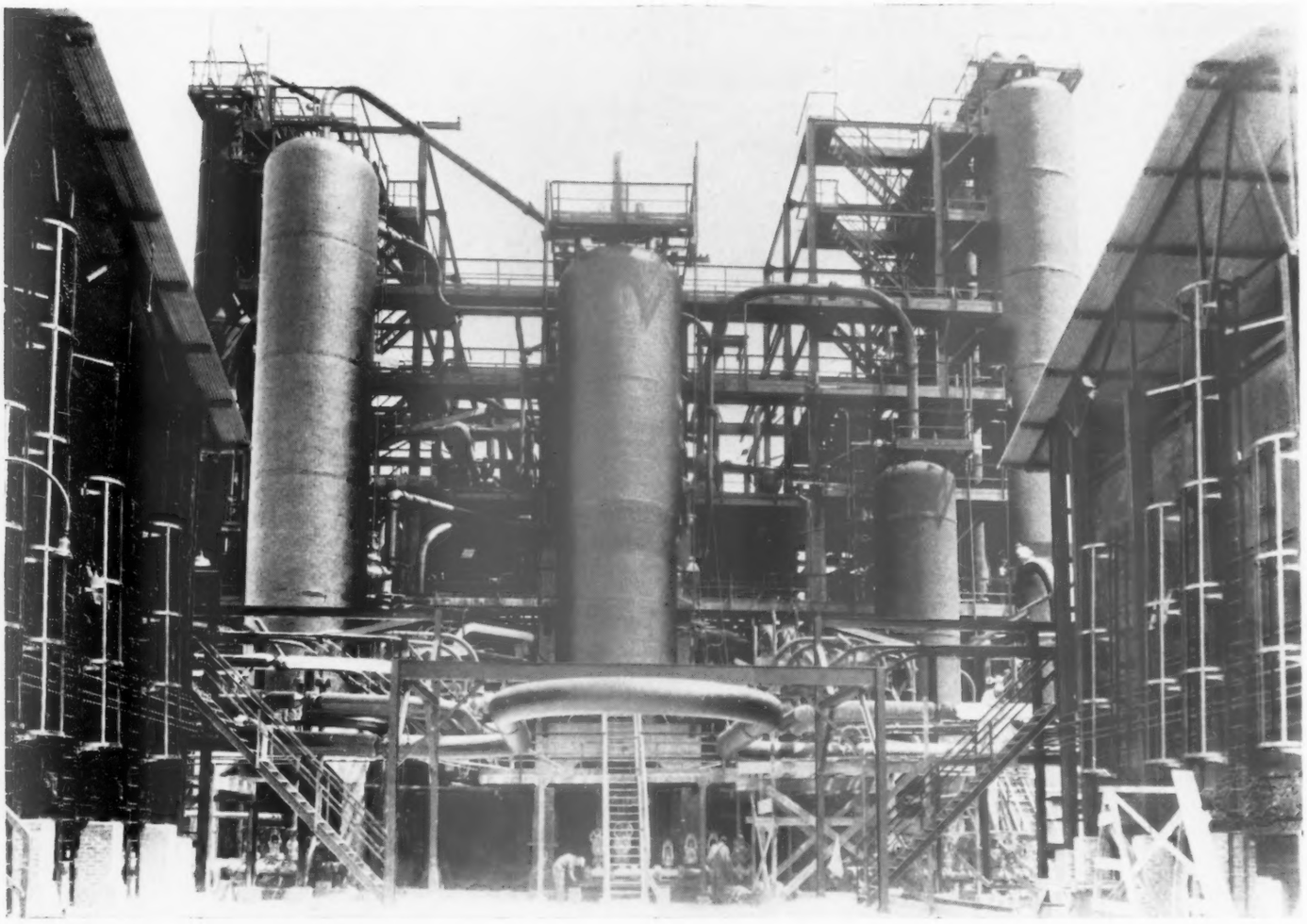
Of Refining Technology Articles

July-December, 1942

Index No.	Subject	Issue	Page
026	*Chemical Societies and Institutes*		
	Oil's Research Put on Wartime Footing To Produce More, Better Products	Sept. 30	R-318
094	*Materials used in Petroleum and Related Industries*		
	Anhydrous Hydrofluoric Acid . . Properties as an Alkylation Catalyst	Oct. 28	R-366
	Reduce Valve Requirements in Designing Wartime Plants, Refiners are Told	Sept. 30	R-295
	Replacing High-Alloy Steels in War Refineries	Aug. 26	R-265
	War Emergency Specifications are Proposed for Refinery Bolting to Conserve Alloys	Aug. 26	R-257
211	*Optical Properties*		
	Photoelectric Color Test Proposed for Lubricating and Refined Oils	Oct. 28	R-369
213	*Density and Volume Relationships*		
	Phase Equilibria at High Temperatures-Part 1	Oct. 28	R-374
	Phase Equilibria at High Temperatures-Part 2.	Nov. 25	R-432
214	*Changing Phase Properties*		
	Phase Equilibria at High Temperatures-Part 1	Oct. 28	R-374
	Phase Equilibria at High Temperatures-Part 2	Nov. 25	R-432
216	*Other Properties of Liquids*		
	Phase Equilibria at High Temperatures-Part 1	Oct. 28	R-374
	Phase Equilibria at High Temperatures-Part 2	Nov. 25	R-432
223	*Hydrocarbon Compounds and Derivatives in Petroleum & Natural Gas.*		
	ABC of Chemical Derivatives from Petroleum; Article 1 Synthetic Resins and Plastics	Nov. 25	R-413
	Natural Gas Derivatives Can Be Converted Into Wide Range of Wartime Chemicals	Oct. 28	R-343
225	*Determination of Water, Solids, and Other Impurities in Liquid Hydrocarbons*		
	Influence of Sulphur Compounds-Part 1	July 29	R-234
	Influence of Sulphur Compounds-Part 2	Aug. 26	R-286
265	*Tests of Various Species and Fractions of Petroleum and Bitumen; Lubricating Oils*		
	Aircraft Lubricating Oils	July 29	R-223
	Standard Engine Test for Heavy-Duty Crankcase Oils Proposed by A.S.T.M.	July 29	R-214
315	*Role of Natural Associations in Genesis of Petroleum and Influencing its Physical Properties and Chemical Constitution*		
	Influence of Sulphur Compounds-Part 1	July 29	R-234
	Influence of Sulphur Compounds-Part 2	Aug. 26	R-286
546	*Dehydrating petroleum*		
	Importance of Proper Desalting of Crude Shown in Photomicroscopic Study	Sep. 30	R-333
584	*Retorting of Oil Shales and Coals*		
	Conversion of Coal Described As a Future Source of Hydrocarbon Products	July 29	R-209
597	*Chemical, Research, and Testing Laboratories*		
	Photoelectric Color Test Proposed For Lubricating and Refined Oils	Oct. 28	R-369
615	*Pipeline transportation of Petroleum*		
	'Midget' Refinery Processes Crude from Pipelines Into Fuel for Pumping Station Engines	July 29	R-206
644	*Steel Oil Storage Tanks—Corrosion of Steel Tanks*		
	Gunite Linings are Practical Emergency Means For Protecting Steel Tanks from Corrosion	Nov. 25	R-397
720	*Refinery Processes; Chemistry of Oil Refining*		
	The Chemical Aspects of Synthetic Rubber	Sept. 30	R-330
	Chemistry of Butadiene from Farm Crops	Oct. 28	R-385
	Natural Gas Derivatives Can Be Converted Into Wide Range of Wartime Chemicals	Oct. 28	R-343
721	*Distillation*		
	Adaptation of the Houdry Process Provides Continuous Cracking	July 29	R-210
	Houdry Two-Stage Dehydrogenation Catalytic Process for Manufacture of Butadiene	Sept. 30	R-305
	The Thermofor Catalytic Cracking Process	Nov. 25	R-427
730	*Refinery Construction, Equipment, and Materials*		
	Plastics Used as Substitute Materials In Wartime Refinery Maintenance	Sept. 30	R-301
	29 Places to Save Critical Materials in Building Wartime Refineries	Sept. 30	R-297
731	*Refinery Layout and Design*		
	Conserve Control Instruments in Design Of Wartime Plants, Refiners Urged	Oct. 28	R-353
	How Refiners Meet War Shortages with Special New Plant Designs	Aug. 26	R-251
	War Emergency Steel-Making Changes Plant Design	July 29	R-199
	WPB Demands Plants Be Designed To Save Materials	July 29	R-202
	Wartime Plant Design	Nov. 25	R-407
732	*Materials Used in Refinery Construction*		
	How Refiners Meet War Shortages With Special New Plant Designs	Aug. 26	R-251
	Metal Reclaimed from Junk Piles Built a War 'Lube' Oil Plant	July 29	R-204
	Reclamation Projects Standardized to Save Working Time and Money	Aug. 26	R-253
	Tankage "Juggled", Vessels Converted, To Conserve Steel in Wartime Plant	Oct. 28	R-351
	Wartime Plant Design	Nov. 25	R-407
	WPB Demands Plants Be Designed to Save Materials	July 29	R-202
	Application of the Substitute NE Steels in Oil Industry Being Studied	July 29	R-200
	War Emergency Steel-Making Changes Design	July 29	R-199
	Hand Wheel on Automatic Control Valve Cuts Block Valve Requirements	Oct. 28	R-352
	Home-Made Welded Flanges and Fittings Speed Construction of War Refineries	Oct. 28	R-348
	Home-Made Welded Pipe Fittings Conserve Construction	Nov. 25	R-410
	Conserve Control Instruments in Design Of Wartime Plants, Refiners Urged	Oct. 28	R-353
	Pumps for Handling Chemicals	Oct. 28	R-382
	Wartime Selection and Maintenance of Refinery Induction Motors	Oct. 28	R-355
733	*Refinery Buildings and Structures*		
	How Refiners Meet War Shortages with Special New Plant Designs	Aug. 26	R-251
734	*Distillation Equipment*		
	'Midget' Refinery Processes Crude from Pipelines Into Fuel for Pumping Station Engines	July 29	R-206
	Crude Naphtha Stabilizer Performance	Aug. 26	R-277
	Enameled Bubble Caps Have Longer Life, Clean Easier Than Unsurfaced Metal	July 29	R-205
739	*Other Data on Refinery Construction*		
	Home-Made Welded Flanges and Fittings Speed Construction of War Refineries	Oct. 28	R-348
	Storing Butadiene at Low Temperature Shown to Save Steel and Decrease Costs	Oct. 28	R-361
	Gunite Linings are Practical Emergency Means For Protecting Steel Tanks from Corrosion	Nov. 25	R-397
	How to Design a Materials-Saving War Refinery Manifold	Aug. 26	R-260
	Reduce Valve Requirements in Designing Wartime Plants, Refiners are Told	Sept. 30	R-295
	New Processes Bring Pumping Problems In the Wartime Refining Plants	Aug. 26	R-263
	Wartime Practices Adopted to Conserve Centrifugal Pumps in Refineries	Oct. 28	R-354
740	*Refinery Operation and Control*		
	How Germans Blackout Refineries Is Told WPRA Technical Group	Sept. 30	R-314
741	*Distillation Practice*		
	Cycle Timers on Houdry Unit Control Board Show How Catalyst Cases Are Functioning	Sept. 30	R-315
747	*Sampling, Metering, and Testing*		
	Photoelectric Color Test Proposed For Lubricating and Refiner Oils	Oct. 28	R-369
748	*Pumping and Control of Oils*		
	Cycle Timers on Houdry Unit Control Board Show How Catalyst Cases Are Functioning	Sept. 30	R-315
751	*Naphthas—Aviation Fuel*		
	Refinery Conversion Program Will Provide Oil Products to Meet Many War Demands	Aug. 26	R-247
751	*Naphthas—Aromatic Hydrocarbons: Benzene; Toluene, Xylene, Benzol, etc.*		
	Acetylene and Other War Chemicals Made by Cracking in a Regenerative Furnace	Aug. 26	R-270
762	*Power Plant and Power Distribution*		
	Turbines Generate By-Product Power from Refinery Process Gases	July 29	R-211

(Continued on next page)

Combination Crude Polyform and Gas Reversion Plant



A combination crude polyform and gas reversion plant of the type under construction by several oil companies to supply aviation gasoline base stock and butane-butylene fractions as feed stock for alkylation or butadiene plants. By the circulation of propanes with the cracking stock and the removal of the b-b fraction, the process is capable of producing large quantities of this material for use in the war emergency. This plant processes 25,000 to 30,000 b/d of West Texas crude and employs the polyform principle on all of the cracking coils, the visbreaker, once-through gas oil cracking, recycle gas oil and naphtha cracking. At either side in the picture are large Lummus heaters which have a combined heat load of 300 million Btu/hr. and combined heat release of 400 million Btu/hr. The tower in the center is the evaporator, that on the left the crude flash tower, and that on the right the fuel oil flash tower. The towers on the extreme left background and the right background are the stabilizers and absorbers. (Photo from Lummus Co.)

Semi-Annual Subject Index
(Continued)

Index No.	Subject	Issue	Page
765	*Testing and Research Laboratories*		
	Oil's Research Put on Wartime Footing To Produce More, Better Products	Sept. 30	R-318
769	*Other Auxiliary Plants and Departments*		
	Army Orders Refinery Safety Work Adapted to Wartime Conditions	Nov. 25	R-391
	Petroleum Pitch is Found Effective in Combating Magnesium Fires	Sept. 30	R-307
	Foam Directory Provides for Pooling Supplies in Oil Fire Emergency	July 29	R-207
772	*Compression and Refrigeration Process*		
	Converting Standard Compressors For Service in Butadiene Plants	Aug. 26	R-254
	How Shell Saved 6000 H. P. of New Compressors in Expanding Aviation Gasoline Plants	Aug. 26	R-256
775	*Extraction of Gasoline and Other Light Condensates from Natural Gas*		
	Importance of Natural Gasoline and Derivatives To Synthetic Rubber and Aviation 'Gas' Programs	Nov. 25	R-420
777	*Extraction of Toluol, Benzol, Benzene and Other By-Products*		
	Acetylene and Other War Chemicals Made By Cracking in a Regenerative Furnace	Aug. 26	R-270
	Refinery Conversion Program Will Provide Oil Products To Meet Many War Demands	Aug. 26	R-247
780	*Manufacture of Carbon Black*		
	Importance of Natural Gasoline and Derivatives To Synthetic Rubber and Aviation 'Gas' Programs	Nov. 25	R-420
791	*Corrosion in Refinery Equipment*		
	Application of Corrosion Resistant Alloys To Natural Gasoline Plants	Sept. 30	R-308
803	*Utilization of Lubricating Oils and Greases*		
	Aircraft Lubricating Oils	July 29	R-223
804	*Utilization of Fuel Oil*		
	Oil-Coal Mixture Proposed As Emergency Fuel for Industrial Oil Furnaces	Oct. 28	R-363
934	*Labor Management—Safety and Accident Prevention*		
	Army Orders Refinery Safety Work Adapted to Wartime Conditions	Nov. 25	R-391
936	*Conservation of Supplies, Material and Power*		
	Metal Reclaimed from Junk Piles Built a War 'Lube' Oil Plant	July 29	R-204
	Reclamation Projects Standardized to Save Working Time and Money	Aug. 26	R-253
967	*Influence of Competition with Substitute Products*		
	Oil-Coal Mixture Proposed As Emergency Fuel for Industrial Oil Furnaces	Oct. 28	R-363
977	*Conservation in Petroleum and Natural Gas Utilization*		
	Oil-Coal Mixture Proposed As Emergency Fuel for Industrial Oil Furnaces	Oct. 28	R-363

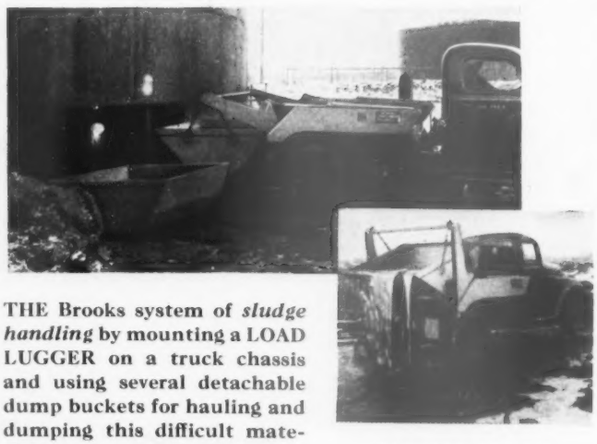
NPN SEMI-ANNUAL AUTHOR INDEX

Of Refining Technology Articles

July-December, 1942

Author	Title	Issue	Page
Brown, George Granger	Phase Equilibria at High Temperatures—Part 1 (also by R. R. White)	Oct. 28	R-374
Brown, George Granger	Phase Equilibria at High Temperatures—Part 2 (also by R. R. White)	Nov. 25	R-432
Court, W. F.	Tankage "Juggled", Vessels Converted, To Conserve Steel in Wartime Plant	Oct. 28	R-351
Dixon, E. S.	Gunite Linings are Practical Emergency Means For Protecting Steel Tanks	Nov. 25	R-397
Dotterweich, Frank H.	Importance of Natural Gasoline and Derivatives To Synthetic Rubber and Aviation 'Gas' Programs (also by Paul M. Raigorodsky)	Nov. 25	R-420
Egloff, Gustav	Natural Gas Derivatives Can be Converted Into Wide Range of Chemicals	Oct. 28	R-343
Evans, L. P.	The Thermofor Catalytic Cracking Process (also by C. V. Hornberg, and J. W. Payne, and T. P. Simpson)	Nov. 25	R-427
Goldsbury, John	Turbines Generate By-Product Power from Refinery Process Gases (also by J. R. Henderson)	July 29	R-211
Grodner, A.	Replacing High-Alloy Steels in War Refineries	Aug. 26	R-265
Henderson, J. R.	Turbines Generate By-Product Power From Refinery Process Gases (also by John Goldsbury)	July 29	R-211
Hornberg, C. V.	The Thermofor Catalytic Cracking Process (also by J. W. Payne, and T. P. Simpson, and L. P. Evans)	Nov. 25	R-427
Hurley, K. P.	New Processes Bring Pumping Problems (also by Drew T. Whiting)	Aug. 26	R-263
Kelly, C. F.	Gunite Linings are Practical Emergency Means For Protecting Tank Corrosion (also by F. L. Newcomb and E. S. Dixon)	Nov. 25	R-397
Larson, C. M.	Aircraft Lubricating Oils	July 29	R-223
Lexander, George A.	Foam Directory Provides for Pooling Supplies in Oil Fire Emergency	July 29	R-207
McGiffin, J. Q.	Naphtha Stabilizer Performance	Aug. 26	R-277
Mellen, W. W.	Pumps for Handling Chemicals (also by A. P. Smith)	Oct. 28	R-382
Miller, Max B.	Wartime Plant Design	Nov. 25	R-407
Mills, B. M.	Wartime Selection and Maintenance Of Refinery Induction Motors	Oct. 28	R-355
Morton, B. B.	Application of Corrosion Resistant Alloys To Natural Gasoline Plants	Sept. 30	R-308
Newcomb, F. L.	Gunite Linings are Practical Emergency Means For Protecting Tanks from Corrosion (also by E. S. Dixon, and C. F. Kelly)	Nov. 25	R-397
Payne, J. W.	The Thermofor Catalytic Cracking Process (also by T. P. Simpson, and L. P. Evans, and C. V. Hornberg)	Nov. 25	R-427
Raigorodsky, Paul M.	Importance of Natural Gasoline and Derivatives To Synthetic Rubber and Aviation 'Gas' Programs (also by Frank H. Dotterweich)	Nov. 25	R-420
Ryan, Julian G.	Influence of Sulfur Compounds—Part 1	July 29	R-234
Ryan, Julian G.	Influence of Sulfur Compounds—Part 2	Aug. 26	R-286
Simpson, T. P.	The Thermofor Catalytic Cracking Process (also by L. P. Evans, and C. V. Hornberg, and J. W. Payne)	Nov. 25	R-427
Smith, A. P.	Pumps for Handling Chemicals (also by W. W. Mellen)	Oct. 28	R-382
Thayer, C. H.	Houdry Two-Stage Dehydrogenation Catalytic Process for Manufacture of Butadiene (also by R. C. Lassiat, and E. R. Lederer)	Sept. 30	R-305
Thiel, B. C.	Converting Standard Compressors For Service in Butadiene Plants	Aug. 26	R-254
Wakeman, R. L.	ABC of Chemical Derivatives from Petroleum (also by B. H. Weil)	Nov. 25	R-413
Weil, B. H.	ABC of Chemical Derivatives from Petroleum (also by R. L. Wakeman)	Nov. 25	R-413
White, Robert Roy	Phase Equilibria at High Temperatures—Part 1 (also by G. G. Brown)	Oct. 28	R-374
White, Robert Roy	Phase Equilibria at High Temperatures—Part 2 (also by G. G. Brown)	Nov. 25	R-432
Whiting, Drew T.	New Processes Bring Pumping Problems In the Wartime Refining Plants (also by K. P. Hurley)	Aug. 26	R-263

Handle *Sludge* with Load Luggers



Showing typical method of hoisting sludge-filled buckets and dumping at waste pond.

Write for FOLDER

THE Brooks system of *sludge handling* by mounting a LOAD LUGGER on a truck chassis and using several detachable dump buckets for hauling and dumping this difficult material is the practical method for oil refineries, marine terminals and tank cars. Get full details today of this time-saving, truck - conserving equipment.

2002 Davenport Road Knoxville, Tennessee
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

INDEX TO ADVERTISERS

Technical Section

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

American Meter Co.
Badger & Sons Co., E. B.
Blackmer Pump Co.
Brooks Equipment & Mfg. Co. R-96
Clark Bros. Co., Inc.
Emery Industries, Inc.
Erie Bolt & Nut Co. R-95
Filtrol Corp. R-89
Johns-Manville Corp. R-85
Kellogg Co., M. W. R-77
Kimble Glass Co.
Lummus Co.
Monsanto Chemical Co.
Pennsylvania Salt Mfg. Co.
Petroleum Rectifying Co. of Calif.
Phillips Petroleum Co.
Sun Shipbuilding & Dry Dock Co.
Taylor Instrument Companies
Universal Oil Products R-81

Contents

Technical Section

★

FEBRUARY 3, 1943

Meeting the Manpower Shortage in Vital Jobs in the Refinery R-51

Twenty-Story Cracking Plant Makes Aviation Gasoline by Fluid Catalytic Method R-56

ABC of Chemical Derivatives from Petroleum: Article III. Textile Fibers and Finishing Agents, by R. L. Wakeman and B. H. Weil R-60

Oil Company Plant Makes Methanol, Formaldehyle and Related Chemical Products from Natural Gas R-72

Wartime Standards Are Adopted for Refinery Tubes and Heat Exchanger and Condenser Tubes R-66

Conservation of Refinery Materials—Gulf Oil Corporation Emergency Specifications for Plant Design, Construction and Repair R-68

Design and Construction of a 33-Ft. Diameter Arc-Welded Vacuum Fractionating Tower, by Egon F. Brummerstedt R-77

Collectively, Chemical Field is Seen as Attractive to Refiners, Not in Making Single Products, by John C. Walker R-84

Reduction of the Ash Content of Residual Fuel Oil with Boric Acid, by E. T. Scafe, K. F. Hayden and V. A. Kalichevsky R-86

Propose New Standard Test to Indicate Acidity of Lubricating Oils R-90

Seek Maximum Yield of Petroleum Coke R-92

Note—The decimal numbers which appear in the margin opposite the heading of articles throughout the Technical Section are for the benefit of readers who use the Uren Decimal Index System in filing and indexing articles.